Air Operator Certificate Requirements

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INTRODUCTION

EFFECTIVE DATE : 5 OCTOBER 2012
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1 Pursuant to paragraph 87 of the Air Navigation Order (ANO), an applicant seeking to obtain an Air Operator Certificate shall demonstrate compliance with the requirements in this AOCR and all other applicable requirements prescribed by the Authority.

2 By being specifically referred to in paragraph 87 of the ANO, this AOCR including its appendices, gains the force and effect of the ANO. The applicant for and holder of a Singapore AOC are hence required to comply with the requirements contained in this AOCR and its appendices. Failure to comply with any of these requirements may result in suspension or revocation or penalties provided under the Thirteenth Schedule of the ANO.

3 This AOCR states the necessary conditions, qualities, qualifications, standards and procedures necessary to qualify for and maintain an AOC, as well as to incorporate new practices or procedures to ensure the safety of the travelling public.

4 The Civil Aviation Authority of Singapore (CAAS) will hereafter be referred to as the Authority in the AOCR. The 'Chief Executive' refers to the Director General of CAAS. This will include any person authorised by him to act on his behalf and any person acting in that capacity.

5 Authorised Officers are 'authorised persons' for the purpose of the AOCR. These officers are authorised to examine documents, inspect premises and equipment and to board aircraft in the course of discharging their duties.

6 Supplementary requirements or advisory materials will be notified in the form of Notices to Airmen (NOTAM), Aeronautical Information Circulars (AIC), Advisory Circulars (AC), Aeronautical Information Publications (AIP), Airworthiness Notices (AN), Singapore Air Safety Publications (SASP), Singapore Airworthiness Requirements (SAR) and Manual of Standards – Units of Measurement to be used for Air and Ground Operations or any other official publication so issued by the Authority.

7 Queries on the AOCR may be referred to:

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DEFINITIONS

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1 In this Requirement, unless the context otherwise requires -

"Acts of unlawful interference" means acts or attempted acts such as to jeopardise the safety of civil aviation and air transport, i.e.

- unlawful seizure of aircraft in flight,
- unlawful seizure of aircraft on the ground,
- hostage-taking on board an aircraft or on aerodromes,
- forcible intrusion on board an aircraft, at an airport or on the premises of an aeronautical facility,
- introduction on board an aircraft or at an airport of a weapon or hazardous device or material intended for criminal purposes,
- communication of false information as to jeopardise the safety of an aircraft in flight or on the ground, of passengers, crew, ground personnel or the general public, at an airport or on the premises of a civil aviation facility.

"Aerodrome" means a defined area on land (including any building, installation and equipment) used or intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

"Aerodrome operating minima" in relation to the operation of an aircraft at an aerodrome, means the limits of usability of an aerodrome for:

(a) take-off, expressed in terms of runway visual range or visibility, or both, and cloud conditions where necessary;

(b) landing in 2D instrument approach operations, expressed in terms of visibility or runway visual range, or both, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions; and

(c) landing in 3D instrument approach operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the type or category of operations, or both.

"Alternate aerodrome" means an aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to, or to land at, the aerodrome of intended landing and which meets all of the following requirements:

(a) the necessary services and facilities are available;

(b) the aircraft performance requirements can be met;

(c) the aerodrome is operational at the expected time of use. Alternate aerodromes include the following:

> *"Take-off alternate"* means an alternate aerodrome at which an aircraft would be able to land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.
>
> *"En-route alternate"* means an alternate aerodrome at which an aircraft would be able to land in the event that a diversion becomes necessary while en route.
>
> *"Destination alternate"* means an alternate aerodrome at which an aircraft would be able to land should it become either impossible or inadvisable to land at the aerodrome of intended landing.
>
> Note. — The aerodrome from which a flight departs may also be an en-route or a destination alternate aerodrome for that flight.

"Altimetry system error (ASE)" means the difference between the altitude indicated by the altimeter display, assuming a correct altimeter barometric setting, and the pressure altitude corresponding to the undisturbed ambient pressure

"Air operator certificate (AOC)" means a certificate authorising an operator to carry out specified public transport operations.

"ATS unit" means an Air Traffic Services Unit as defined in the Eleventh Schedule of the ANO.

"Aircraft tracking" means a ground-based process that maintains and updates, at standardized intervals, a record of the four dimensional position (latitude, longitude, altitude, time) of an individual aircraft in flight, and "to track an aircraft" shall be construed accordingly.

Area navigation (RNAV)". A method of navigation which permits aircraft operation on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

Note.— Area navigation includes performance-based navigation as well as other operations that do not meet the definition of performance-based navigation.

"Cabin crew member" means a crew member who performs, in the interest of safety of passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but does not include a flight crew member.

"COMAT" means operator material carried on an operator's aircraft for the operator's own purposes.

"Combined vision system (CVS)" means a system to display images from a combination of an enhanced vision system (EVS) and a synthetic vision system (SVS).

"Configuration deviation list (CDL)" means a list established by the organisation responsible for the type design with the approval of the State of Design which identifies any external parts of an aircraft type which may be missing at the commencement of a flight, and which contains, where necessary, any information on associated operating limitations and performance correction.

"Congested area" in relation to a city, town or settlement, means any area which is substantially used for residential, commercial or recreational purposes.

"Continuing airworthiness". The set of processes by which all aircraft comply with the applicable airworthiness requirements and remain in a condition for safe operation throughout their operating life.
"Continuous descent final approach (CDFA)" means a technique consistent with stabilised approach procedures, for flying the final approach segment of a non-precision instrument approach procedure as a continuous descent, without level-off, from an altitude/height at or above the final approach fix altitude/height to a point approximately 15 m (50 ft) above the landing threshold or the point where the flare manoeuvre should begin for the type of aircraft flown.

"Critical engine". Any engine whose failure gives the most adverse effect on the aircraft characteristics relative to the case under consideration.

Note.— On some aircraft there may be more than one equally critical engine. In this case, the expression "the critical engine" means one of those critical engines.

"Dangerous goods" means articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions.

"Decision altitude" or (DA), or *"Decision height"or (DH),in relation to the operation of an aircraft at an aerodrome,* means a specified altitude or height in a 3D instrument approach operations at which the pilot-in-command must initiate a missed approach if the visual reference to continue the approach has not been established.

Note 1. — Decision altitude (DA) is referenced to mean sea level and decision height (DH) is referenced to the threshold elevation.

Note 2.— The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In Category III operations with a decision height the required visual reference is that specified for the particular procedure and operation.

Note 3. — For convenience where both expressions are used they may be written in the form "decision altitude/height" and abbreviated "DA/H".

"Electronic flight bag (EFB)" means an electronic information system, comprised of equipment and applications, for flight crew which allows for storing, updating, displaying and processing of EFB functions to support flight operations or duties.

"Enhanced vision system (EVS)". A system to display electronic real-time images of the external scene achieved through the use of image sensors.

Note.— EVS does not include night vision imaging systems (NVIS).

"Emergency locator transmitter (ELT)" means an emergency locator transmitter which –

(a) broadcasts distinctive signals on designated frequencies and, depending on application, may either operate automatically following a crash or be manually activated; and

(b) satisfies the requirements and operates in accordance with the provisions of Annex 10 to the Convention on International Civil Aviation and any amendment thereto as amended by the Council of the International Civil Aviation Organisation and accepted by the Government.

"En-route phase" means that part of the flight from the end of the take-off and initial climb phase to the commencement of the approach and landing phase.

Note.— Where adequate obstacle clearance cannot be guaranteed visually, flights must be planned to ensure that obstacles can be cleared by an appropriate margin. In the event of failure of the critical power-unit, operators may need to adopt alternative procedures.

"Extended diversion time operations (EDTO)" means any operation by an aeroplane with two or more turbine engines where the diversion time to an en-route alternate aerodrome is greater than the threshold time established by the Authority.

"EDTO critical fuel" means the fuel quantity necessary to fly to an en-route alternate aerodrome considering, at the most critical point on the route, the most limiting system failure.

"EDTO-significant system" means an aeroplane system whose failure or degradation could adversely affect the safety particular to an EDTO flight, or whose continued functioning is specifically important to the safe flight and landing of an aeroplane during an EDTO diversion.

"Final approach segment (FAS)" means the segment of an instrument approach in which alignment and descent for a landing are accomplished.

"Flight crew" means a crew member, including the pilot, flight engineer, flight navigator and flight radio operator who is charged with duties essential to the operation of an aircraft during a flight duty period.

"Flight despatcher/flight operations officer" means a suitably qualified person designated by the operator of the aircraft to provide —

(a) briefing and/or assistance to the pilot-in-command in the safe conduct of the flight, including pre-flight preparation for the despatch release; and

(b) control and supervision of flight while acting as a close link between the aircraft in flight and the ground services, and between the flight crew and the operator's ground staff.

"Flight manual" means a manual, associated with the certificate of airworthiness, containing limitations within which the aircraft is to be considered airworthy, and instructions and information necessary to the flight crew members for the safe operation of the aircraft.

"Flight plan" means specified information provided to air traffic services units relating to an intended flight or portion of a flight of an aircraft.

"Flight safety documents system". A set of interrelated documentation established by the operator, compiling and organising information necessary for flight and ground operations, and comprising, as a minimum, the operations manual and the operator's maintenance control manual.

"Flight simulator" means a type of apparatus that provides an accurate representation of a flight deck of a particular aircraft type to the extent that the mechanical, electrical, electronic and other aircraft systems control functions, the normal environment of flight crew members, and the performance and flight characteristics of that aircraft type are realistically simulated.

"Flight simulation training device" means an apparatus in which flight conditions are simulated on the ground and includes a flight simulator, a flight procedures trainer and a basic instrument flight trainer;"

"Flight time — aeroplanes" means the total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

Note.— Flight time as here defined is synonymous with the term "block to block" time or "chock to chock" time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.

"Flight time — helicopters" means the total time from the moment a helicopter's rotor blades start turning until the moment the helicopter finally comes to rest at the end of the flight, and the rotor blades are stopped.

Note. — This definition is intended only for the purpose of flight and duty time regulation.

"Ground handling" means services necessary for an aircraft's arrival at, and departure from, an airport, other than air traffic services.

"Head-up display (HUD)". A display system that presents flight information into the pilot's forward external field of view.

"Heliport". An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

Note 1. — Throughout this document, when the term "heliport" is used, it is intended that the term also applies to aerodromes primarily meant for the use of aero planes.

Note 2. — Helicopters may be operated to and from areas other than heliports.
"Human factors principles" means principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

"Instrument approach operations" means an approach and landing using instruments for navigation guidance based on an instrument approach procedure, executed either by a 2D or 3D instrument approach operation.

(a) a two-dimensional (2D) instrument approach operation means an instrument approach operation using lateral navigation guidance only; and

(b) a three-dimensional (3D) instrument approach operation means an instrument approach operation using both lateral and vertical navigation guidance.

Note.— Lateral and vertical navigation guidance refers to the guidance provided either by:

(a) a ground-based radio navigation aid; or

(b) computer-generated navigation data from ground-based, space-based, self-contained navigation aids or a combination of these.

"Instrument approach procedure (IAP)" means a series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from

(a) the initial approach fix; or

(b) the beginning of a defined arrival route, where applicable

to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply.

Instrument approach procedures are classified as follows:

(a) *"Non-precision approach (NPA) procedure"*. An instrument approach procedure designed for 2D instrument approach operations Type A.

Note.— Non-precision approach procedures may be flown using a continuous descent final approach (CDFA) technique. CDFA with advisory VNAV guidance calculated by on-board equipment (see PANS-OPS (Doc 8168), Volume I, Part I, Section 4, Chapter 1, paragraph 1.8.1) are considered 3D instrument approach operations. CDFA with manual calculation of the required rate of descent are considered 2D instrument approach operations. For more information on CDFA refer to PANS-OPS (Doc 8168), Volume I, Section 1.7 and 1.8.

(b) *"Approach procedure with vertical guidance (APV)"*. A performance-based navigation (PBN) instrument approach procedure designed for 3D instrument approach operations Type A.

(c) *"Precision approach (PA) procedure"*. An instrument approach procedure based on navigation systems (ILS, MLS, GLS and SBAS Cat I) designed for 3D instrument approach operations Type A or B.

Note.— Refer to paragraph 13.1.3 in Chapter 2 for instrument approach operation types.

"Instrument meteorological conditions (IMC)" means meteorological conditions expressed in terms of visibility distance from cloud, and ceiling, less the minima specified for visual meteorological conditions.

"Isolated aerodrome" means a destination aerodrome for which there is no destination alternate aerodrome suitable for a given aeroplane type.

"Maintenance" means the performance of tasks required to ensure the continued airworthiness of an aircraft, including any one, or combination of, the following:

(a) overhaul;
(b) inspection;
(c) replacement;
(d) defect rectification; and
(e) the embodiment of a modification or repair;

"Maintenance programme" means the maintenance schedule and related procedures, such as a reliability programme, necessary for the safe operation of those aircraft to which it applies.

"Maintenance schedule" means a document which describes the specific scheduled maintenance tasks and their frequency of completion necessary for the safe operation of those aircraft to which it applies.

"Master minimum equipment list (MMEL)". A list established for a particular aircraft type by the organisation responsible for the type design with the approval of the State of Design containing items, one or more of which is permitted to be unserviceable at the commencement of a flight. The MMEL may be associated with special operating conditions, limitations or procedures.

"Maximum diversion time" means the maximum allowable range, expressed in time, from a point on a route to an en-route alternate aerodrome.

"Minimum equipment list (MEL)". A list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative,

prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type.

"Meteorological information" means a meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions.

"Minimum descent altitude (MDA)" or *"Minimum descent height (MDH)"* means a specified altitude or height in a non-precision 2D instrument approach operation or circling approach operation below which the pilot-in-command must not continue the descent without the required visual reference.

Note 1.— Minimum descent altitude (MDA) is referenced to mean sea level and minimum descent height (MDH) is referenced to the aerodrome elevation or to the threshold
elevation if that is more than 2 m (7 ft) below the aerodrome elevation. A minimum descent height for a circling approach is referenced to the aerodrome elevation.

Note 2. — The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In the case of a circling approach the required visual reference is the runway environment.

Note 3.— For convenience when both expressions are used they may be written in the form "Minimum descent altitude/height" and abbreviated "MDA/H".

"*Navigation specification*". A set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specifications:

> *"RNP specification"*. A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.
>
> *"RNAV specification"*. A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.
>
> Note.— The Performance-based Navigation Manual (Doc 9613), Volume II contains detailed guidance on navigation specifications

"Night" means the time between 20 minutes after sunset and 20 minutes before sunrise, sunset and sunrise being determined at surface level.

"Obstacle clearance altitude (OCA)" or *"obstacle clearance height (OCH)"* means the lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

Note 1.— Obstacle clearance altitude is referenced to mean sea level and obstacle clearance height is referenced to the threshold elevation or in the case of non-precision approaches procedures to the aerodrome elevation or the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. An obstacle clearance height for a circling approach is referenced to the aerodrome elevation.

"Operating base" means the location from which operational control is exercised.

Note. — An operating base is normally the location where personnel involved in the operation of the aeroplane work and the records associated with the operation are located. An operating base has a degree of permanency beyond that of a regular point of call.

"Operation". An activity or group of activities which are subject to the same or similar hazards and which require a set of equipment to be specified, or the achievement and maintenance of a set of pilot competencies, to eliminate or mitigate the risk of such hazards.

Note.— Such activities could include, but would not be limited to, offshore operations, heli-hoist operations or emergency medical service.

"Operational control" means the exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight.

"Operational flight plan" means the operator's plan for the safe conduct of the flight based on considerations of aeroplane performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes concerned.

"Operations manual" means a manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

"Operator" has the same meaning assigned to it by paragraph 2(3) of the Air Navigation Order.

"*Operations specifications*". The authorisations, conditions and limitations associated with the air operator certificate and subject to the conditions in the operations manual.

"*Performance-based navigation (PBN*)". Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

Note.— Performance requirements are expressed in navigation specifications (RNAV specification, RNP specification) in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.

"Pilot-in-command" in relation to an aircraft, means a person who for the time being is in charge of the piloting of an aircraft without being under the direction of any pilot in the aircraft.

"Point of no return" means the last possible geographic point at which an aircraft can proceed to the destination aerodrome as well as to an available en route alternate aerodrome for a given flight.

"Pressure-altitude". An atmospheric pressure expressed in terms of altitude which corresponds to that pressure in the Standard Atmosphere.

Note.— The Standard Atmosphere as defined in ICAO Annex 8 means:

(a) the air is a perfect dry gas;

(b) the physical constants are:
— Sea level mean molar mass:
$M_0 = 28.964420 \times 10^{-3}$ kg mol^{-1}
— Sea level atmospheric pressure:
$P_0 = 1013.250$ hPa
— Sea level temperature:
$t_0 = 15°C$
$T_0 = 288.15$ K
— Sea level atmospheric density:
$\rho_0 = 1.2250$ kg m^{-3}
— Temperature of the ice point:
$T_i = 273.15$ K
— Universal gas constant:
$R^* = 8.31432$ JK^{-1}mol^{-1}

"Psychoactive substances" means alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, but excludes coffee and tobacco.

"Qualification Test Guide (QTG)". The primary reference document used for the evaluation of a FSTD. It contains test results, statements of compliance and the other prescribed information to enable the evaluator to assess if the FSTD meets the test criteria.

"Repair" means the restoration of an aeronautical product to an airworthy condition to ensure that the aircraft or component continues to comply with the design aspects of the appropriate airworthiness requirements used for the issuance of the type certificate for the respective aircraft type, after it has been damaged or subjected to wear.

"Rest period" means any period of time on the ground during which a flight crew member is relieved of all duties by the operator.

"Runway visual range (RVR)" means the range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

"Safe forced landing" means unavoidable landing or ditching with a reasonable expectancy of no injuries to persons in the aircraft or on the surface.

"Safety management system" means a systematic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures.

"State of Design" refers to the State having jurisdiction over the organisation responsible for the type design.

"State of Registry" means the State on whose register the aircraft is entered.

"State of the Operator". The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

"State of the Aerodrome" means the State in whose territory the aerodrome is located.

"Synthetic vision system (SVS)" means a system to display data-derived synthetic images of the external scene from the perspective of the flight deck.

"The Authority" means the Civil Aviation Authority of Singapore (CAAS) established under Section 4 of the Civil Aviation Authority of Singapore Act.

"Threshold time" means the range, expressed in time, established by the Authority to an en-route alternate aerodrome, whereby any time beyond requires an operational approval for EDTO from the Authority.

"Total vertical error (TVE)" means the vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level).

"Visual meteorological conditions (VMC)" means meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.

CHAPTER 1
APPLICATION FOR AIR OPERATOR CERTIFICATE

EFFECTIVE DATE : 20 FEBRUARY 2013
REVISION NO : 23 (ISSUE 3)

1 INITIAL APPLICATION FOR AOC

1.1 The application for, and grant of, an AOC is a complicated process involving much effort and detailed work by both the applicant and CAAS. Hence, an applicant should contact the Authority (in this case the CAAS Airworthiness/Flight Operations Division (A/FO)) as far in advance as possible, in any case AT LEAST 6 MONTHS BEFORE the anticipated start of operations. The time taken to process an application will depend on the completeness of the information submitted and the progress the applicant makes in demonstrating an adequate organisation, method of control and supervision of flight operations, training programme and maintenance arrangements consistent with the nature and extent of the operations specified. Nevertheless, no undertaking can be given for an AOC to be granted within any requested timeframe.

1.2 A 5-phase process for systematic handling of all AOC applications has been adopted. The 5 phases are explained briefly below:

(a) **Pre-application discussion phase**

This phase commences when a prospective applicant makes his initial inquiries regarding application for an AOC. A preliminary discussion is held whereby basic information and general certification requirements are discussed, and an application form CAAS(AW)67 is provided when the applicant desires to continue with the AOC application. When the form is correctly completed and returned, a pre-application meeting is arranged, at which the applicants key management and staff will meet with the Authority to discuss the plans and specific aspects of the proposed operation.

(b) **Formal application phase**

This phase begins when the applicant submits the completed CAAS(AW)67 form and required manuals and exposition documents (maintenance control manuals – see Chapters 2, 4 and 8) to the Authority. This phase shall commence at least 6 months before the desired start of revenue operations. After preliminary review to verify that the applicant has submitted the required information and attachments, a formal application meeting with the applicant's management team will be arranged where detailed examination of all aspects of proposed aircraft types and their operations, management structure, ground and flight crew structure and training, premises, equipment, etc, will be conducted. The applicant's proposed schedule of events for submissions, inspections and training of the Authority's officers on the proposed aircraft type(s) (at the applicant's expense) will be examined and agreed by both parties to guide the subsequent phases.

(c) **Document evaluation phase**

A thorough evaluation of all the manuals, documents and attachments etc that are required by regulations to be submitted to support an AOC application will begin in this phase. This is to ensure that all documentation meets the required standards and requirements. All manuals and documents submitted will also be retained by the Authority during the currency of an AOC (see Chapter 2).

(d) **Applicant's demonstration and Authority's evaluation phase**

An applicant is required to demonstrate his ability to comply with regulations and safe operating practices before actual revenue operations can begin. This is to ensure that the applicant has an adequate organisation, method of control and supervision of flight operations, training programme as well as ground handling[1] and maintenance arrangement that are consistent with the nature and extent of operations specified. These may include one or more proving flights where actual performance of activities (maintenance and ground handling and the use of dummy loads where appropriate) and operations, are observed and evaluated by the Authority. All operations must be performed in accordance with applicant's documents and manuals as reviewed in the previous phase. However, the Authority may require additional time or additional proving flights to validate the and overall safe operations before concluding this phase.

(e) **Formal award of AOC**

After all documentation has been assessed to be complete, the demonstration phase has been completed satisfactorily, and the applicant is assessed to be competent, the AOC will be issued with the corresponding operations specifications (containing authorisations, limitations and provisions specific to each applicant) to enable the applicant to commence revenue operations.

1.3 If any significant deficiency is revealed at any stage of the evaluation process and the deficiency cannot be resolved by the interaction between the Authority and the applicant, the Authority will advise the applicant in writing of the nature of the deficiency and the actions required, failing which no further action will be taken by the Authority to process the application.

2 DOCUMENTS TO BE SUBMITTED

2.1 The following documents must be submitted to the Authority together with the completed form CAAS(AW)67 :

(a) Operations Manual(s);
(b) Training Manual(s);
(c) Engineering Exposition Document(s)/ Maintenance Control Manual(s);
(d) Aircraft Flight Manual and Performance Schedules;
(e) Safety Management System Manual; and
(f) Any other relevant manuals/documents

[1] Ground handling includes services that are necessary for an aircraft's arrival at, and departure from, an airport, other than air traffic services.

2.2 RESERVED

3 FORM OF AIR OPERATOR CERTIFICATE AND OPERATIONS SPECIFICATIONS

3.1 Air Operator Certificate is normally valid for one year upon grant or renewal, but may be varied at the sole discretion of the Authority. The type(s) of aircraft that may be flown and the associated operational approvals are specified in the operations specifications.

3.2 See Appendix A for a copy of the AOC, operations specifications and the associated attachments.

4 APPLICATION FOR THE RENEWAL OF AN AOC

4.1 The period of validity of an AOC will not be extended.

4.2 Holders of AOC must apply for the renewal of an AOC using form CAAS(AW)68, including any other forms or documents may be required , at least 30 days before the expiry date of the current AOC.

4.3 The audit and routine inspection results will be used to assess whether the operator can continue to hold an AOC.

5 VARIATION TO EXISTING AOC

5.1 If the holder of an AOC wishes to apply for the variation of its certificate (e.g. inclusion of an additional aircraft type, inclusion of an additional destination or extension of routes) the holder of the AOC shall complete form CAAS(AW)68A with full details of the requested amendments. The minimum notice required is 30 days, but the AOC holder is advised to give as much notice as possible. No undertaking can be given that an application will be dealt with within any requested timeframe. Variation to the AOC also includes changes to the following:

(a) Name of the organisation specified in the Air Operator Certificate.

(b) Address of the organisation specified in the Air Operator Certificate.

(c) The applicant's/operator's chief executive officer or persons nominated in accordance with paragraph 4 of Chapter 8 of this AOCR.

(d) The approved facilities or capabilities.

Note: Justification of the suitability of a person to become chief executive officer will be required.

5.2 On receipt of form CAAS(AW)68A, special inspection may be conducted which include the observation of a proving flight. After all documentation is complete and upon satisfactory completion of any special inspection, the relevant amended page of the AOC or the operations specifications will be sent to the operator as approval for the requested variation to the AOC.

5.3 RESERVED

6 ROUTINE LIAISON AND INSPECTION

6.1 To determine continued competence and compliance by the operator with the applicable requirements, the operator shall permit access by Authorised Officers to its premises, aircraft, equipment and documents, including those handling agents appointed by the operator.

6.2 All Authorised Officers are authorised to be onboard the operator's aircraft, including its flight deck, during normal aircraft operations. Arrangements for such flights will normally be made in advance, but Authorised Officers may also board the aircraft without prior notice to conduct unscheduled inspection. For identifications, all Authorised Officers will carry an authorisation card which will be produced on request.

6.3 The Authority shall not pay any fee or fare to the operator in the respect of the carriage of an Authorised Officer on duty in the operator's aircraft or the aircraft of other airlines. The cost of the passenger ticket including all applicable taxes and fees purchased by the Authority for the Authorised Officer to perform duties outside Singapore shall be borne by the operator. Alternatively the operator may, subject to agreement of the Authority, issue a confirmed commercial passenger ticket where all applicable taxes and fees have been paid for. For the purpose of this sub-paragraph, a "subject to load" ticket is not acceptable to the Authority. When circumstances require Authorised Officers to travel on freighter flights, he/she shall be listed as a passenger in the passenger manifest. A confirmed seat outside the flight deck will be acceptable.

6.4 Operators will be visited from time to time by Authorised Officers. The primary purpose of their visits will be to observe the operations of the AOC holder. This will include the training and testing and qualifications of the operating staff and agents/contractors of the AOC holder.

6.5 The Authorised Officers are also empowered to inspect the licenses of the flight crew and aircraft maintenance engineers, and records of the AOC holder and their agents.

7 MANAGEMENT AND EXECUTIVE STAFF

7.1 A sound and effective management structure is essential. It is particularly important that the operational management should have proper status in the organisation and be in suitably experienced and competent hands. The duties and responsibilities of managers, senior executives and designated representatives in charge of operational control must be clearly defined in writing, and chains of responsibility firmly established. The number and nature of the appointments may vary with the size and complexity of the organisation and its operations. However, the structure and composition of the management must be adequate and properly matched to the operating network and commitments.

Personnel

7.2 The chief executive officer (who shall be the accountable manager) of the operator shall nominate the following persons for the Authority's acceptance:

(a) Head of Flight Operations – He/she should have experience working in an airline or equivalent organisation.

(b) Head of Engineering – He/she should have experience working in an engineering capacity in an airline or equivalent organisation.

(c) Chief Pilot – He/she should hold a ATPL and appropriate ratings for at least one of the aircraft used by the operator.

(d) Head of Safety – He/she should hold a ATPL and appropriate ratings for at least one of the aircraft used by the operator, or he/she should have experience working in an airline or equivalent organisation on aviation safety.

(e) Head of Quality for Operations and Maintenance (see paragraph below on Quality System).

(f) Head of Training – He/she should hold a ATPL and appropriate ratings for at least one of the aircraft used by the operator. He should also hold a CAAS or equivalent Instructor pilot rating.

(g) Head of Ground Handling – He/she should have experience or knowledge in ground handling services.

7.3 These nominated persons shall be conversant with the ANO, the Air Operator Certificate Requirements, the Singapore Airworthiness Requirements and the relevant Annexes to the Chicago Convention and have adequate qualifications and experience for the duties concerned.

7.4 The Authority may, depending on the type of operations, require the operator to nominate additional persons to ensure the safety of the operations or allow for a nominated person to take on more than one role.

Quality System

7.5 The operator shall establish a quality assurance system and designated quality manager(s) to monitor the compliance with, and adequacy of, procedures required to ensure safe operational practices and airworthy aircraft. Compliance monitoring shall include a direct feedback system to the accountable manager to ensure corrective action as necessary.

7.6 The requirements for the Engineering quality system are detailed in Chapter 8. The Flight Operations quality system shall include a quality assurance programme that contains procedures designed to verify that all operations are being conducted in accordance with all applicable requirements, standards and procedures. The flight operations quality assurance programme shall be described in the Operations Manual approved by the Authority.

7.7 The positions held by key personnel will be listed in the operations specifications of each AOC. See paragraph 5 of this chapter for any intended changes.

8 FEES PAYABLE

8.1 A non-refundable fee specified in the Twelfth Schedule of the ANO shall be paid by the applicant for the evaluation of the applicant's qualification for the grant of an AOC.

9 DECISIONS OF THE AUTHORITY

9.1 Pursuant to paragraph 87 of the ANO, the Authority may refuse to grant or renew an AOC.

9.2 If, during the currency of an AOC, the Authority ceases to be satisfied that the holder is competent, the Authority may suspend, revoke or vary the AOC. The holder would normally be given at least one month's notice of the intention to take such action, but provision is made for immediate suspension, revocation or variation if the Authority determines that it is necessary in the interests of the safety of air navigation.

9.3 If an operator ceases operations for which the AOC was issued, or if the Authority revokes or suspends the AOC, the AOC is to be immediately returned to the Authority.

10 AIRCRAFT LEASING ARRANGEMENTS

10.1 The operator shall seek the Authority's approval before engaging in aircraft operational lease arrangements (i.e. dry/wet/damp leases).

10.2 Approval for any operational lease arrangement will only be granted provided the parties have identified all the necessary responsibilities arising from the lease arrangement and the parties involved in the lease arrangement can demonstrate sufficient knowledge and adequate resources to fulfill their roles and responsibilities with regard to the continuing airworthiness and operational control of the aircraft for the duration of the lease.

CHAPTER 2
OPERATIONS MANUAL

EFFECTIVE DATE : 11 JANUARY 2017
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1 PURPOSE AND SCOPE OF MANUALS

1.1 Pursuant to ANO paragraph 25, the operator shall ensure that an Operations manual containing information and instructions as may be necessary to enable the operating staff to perform their duties is provided to such staff. The design of these manuals shall observe human factors principles.

1.2 By definition included in the ANO, "operating staff" means the servants and agents employed by the operator, whether or not as members of the crew of the aircraft, to ensure that the flights of the aircraft are conducted in a safe manner, and includes an operator who himself performs these functions.

1.3 It can readily be seen, therefore, that the form and scope of manuals will vary considerably with the nature and complexity of the operator's organisation and the types of aircraft in use. A "manual" will normally comprise a number of separate volumes, and may well include individual forms such as prepared navigational flight plans supplied by the operator to his crew. Instructions and information to particular groups of operating staff – e.g. Traffic Manuals, Cabin Crew Manual, aircraft crew rostering instructions, safety and accident prevention manual and information on weight and balance supplied to handling agents – are all part of the operations manual. They must all be submitted together with copies of all amendments and temporary instructions. (See paragraph 10 of this chapter on Route Guide).

1.4 The purpose of this Chapter is to give some indication of the manner in which both the specific and general requirements (paragraph 1.1 above) should be met. Only the operation of aircraft will be dealt with; detailed instructions on aircraft maintenance (such as those included in a Maintenance Control Manual or in Maintenance Schedules) are in Chapter 8 of this AOCR and in the Singapore Airworthiness Requirements.

1.5 The operations manual is the primary indication of the standards to be achieved by an operator. Public transport operation is a highly complex matter and must be based on clearly defined standards and procedures. The form and scope of a manual will vary with the size of the undertaking, nature and complexity of the operation. The adequacy of a manual will be assessed largely on this basis.

1.6 Great importance will be attached to the suitability of manuals for regular use by the operating staff and in particular by aircraft crew in flight. For all but the simplest of operations, the division of the manual into a number of separate volumes will be essential. Manuals should be divided in such a way that essential information is immediately available on the flight deck, and extracts or "digests" of information and instructions may sometimes be necessary to supplement drill cards and check lists.

1.7 Each copy of a manual should normally bear a serial number and a list of holders should be maintained by the person responsible for issuing amendments. Where this system is not used, an operator must have satisfactory alternative arrangements for controlling the issue and amendment of manuals. In any case, a method of acknowledgment of receipt of amendments by manual holders should be instituted. Each volume of a manual must be numbered and bear a title and index giving a clear indication of its scope. The title of the person or department responsible for the issue of the manual should also be indicated. At the front of each volume there must be an amendment page to indicate amendment number, date of incorporation, signature or initials of person amending, and page or paragraph affected. Amended pages should be dated. The numbering of pages, sections, paragraphs, etc must be orderly and systematic so as to facilitate immediate identification of any part of the subject matter. The standard of printing, duplicating, binding, section dividers, indexing of sections, etc must be sufficient to enable the document to be read without difficulty and to ensure that it remains intact and legible during normal use.

1.8 The operator shall submit its Operations manual and subsequent amendments to the Authority for the acceptance or approval, as applicable, before issuing them to their users. The purpose of the acceptance and approval process is to verify the adequacy of the operator's systems and procedures for keeping instructions and information under review and for issuing timely amendments as necessary. Evidence of such process are normally supported by the date, stamp and signature of an Authorised Officer. The operator is responsible for ensuring the accuracy and adequacy of the information provided in the manuals. It must be clearly understood by the operator that this responsibility rest solely with the operator who should designate a suitably qualified person or persons to ensure that this responsibility is properly discharged.

1.9 The amendment of the manuals in manuscript will not be acceptable. Any changes or additions, however slight they may be, should normally be incorporated by the issue of a fresh or additional page on which the amended materials is clearly indicated. In the cases where amendments related to safety may seek verbal approval in principle followed by the formal process in writing.

1.10 An operator shall provide, for the use and guidance of operations personnel concerned, an operations manual structured in accordance with Appendix K2. This operations manual shall be acceptable to the Authority and shall be amended or revised as is necessary to ensure that the information contained therein is kept up to date. All such amendments or revisions shall be issued to all personnel that are required to use this manual.

1.11 All operators are required to have adequate procedures to ensure that the flight manual is updated by implementing changes made mandatory or approved by the State of Registry.

2 CREW TO BE CARRIED

2.1 It will normally be sufficient if the minimum crew of public transport is specified in the manual for each type of aircraft, together with a reference to the necessity for specialist crew members where appropriate. Note that the minimum crew for public transport will not necessarily be the same as the minimum crew specified in the Certificate of Airworthiness. In some cases, the operator will need to consider whether the particular circumstances of the operation call for the carriage of additional flight crew. It is a statutory requirement that an aircraft shall have a flight crew adequate in number and designation to ensure the safety of the flight.

2.2 Except where the flight crew is limited to one or two pilots, brief instructions should be included as to the order and circumstances in which command is to be assumed by members of the crew.

2.3 Detailed instructions must be included as to the circumstances in which co-pilots may be permitted to fly the aircraft.

2.4 An aeroplane shall not be operated under the IFR or at night by a single pilot unless:

(a) approved by the Authority;

(b) the flight manual does not require a flight crew of more than one;

(c) the aeroplane is propeller-driven;

(d) the maximum approved passenger seating configuration is not more than nine;

(e) the maximum certificated take-off weight does not exceed 5700kgs;

(f) the pilot-in-command has satisfied requirements of experience, training, checking and recency described in Chapter 4 para 19; and

(g) the aeroplane is equipped with:

(i) a serviceable autopilot that has at least altitude hold and heading select modes;

(ii) a headset with a boom microphone or equivalent; and

(iii) means of displaying charts that enables them to be readable in all ambient conditions.

2.5 All flight crew members required to be on flight deck duty shall remain at their stations except when their absence is necessary for the performance of duties in connection with the operation of the aircraft or for physiological needs.

3 DUTIES OF AIRCRAFT CREW AND OTHER OPERATING STAFF

3.1 In this context, the term "operating staff", as distinct from the aircraft crew, can be taken to mean staff having specific duties in relation to particular flights, which fall within the general pre-flight and in-flight responsibilities of the pilot-in-command. The manual must define the duties and responsibilities of people employed as:

(a) pilot-in-command of the aircraft; the responsibilities and duties for the conduct of the operation and safety of the aircraft and all persons on board, during flight;

(b) flight operations officers/flight dispatchers, if the operator's approved method of control and supervision of flight operations requires the use of flight operations officers/flight dispatchers;

(c) rostering and scheduling staff.

3.2 Flight operations officers/flight dispatchers shall, in conjunction with the operator's method of control and supervision of flight operations:

(a) assist the pilot-in-command in flight preparation and provide the relevant information required;

(b) assist the pilot-in-command in preparing the operational and ATS flight plans, sign when applicable and file the ATS flight plan with the appropriate ATS unit; and

(c) furnish the pilot-in-command while in flight, by appropriate means, with information which may be necessary for the safe conduct of the flight.

(d) notify the appropriate ATS unit when the position of the aeroplane cannot be determined by an aircraft tracking capability and attempts to establish communication with the aeroplane are unsuccessful.

3.3 In the event of an emergency, a flight operations officer/flight dispatcher shall:

(a) initiate such procedures as outlined in the operations manual while avoiding taking any action that would conflict with ATC procedures;

(b) convey safety-related information to the pilot-in-command that may be necessary for the safe conduct of the flight, including information related to any amendments to the flight plan that become necessary in the course of the flight; and

(c) where necessary, notify the appropriate authorities without delay and request for assistance if required, if the emergency endangers the safety of the aircraft or persons and becomes known first to the flight operations officer/flight dispatcher.

Note: It is equally important that the pilot-in-command also conveys similar information to the flight operations officer/flight dispatcher during the course of the flight, particularly in the context of emergency situations.

3.4 In defining the duties of members of the aircraft crew, the operator should include instructions on:-

3.4.1 The briefing of passengers on emergency exits and equipment (including, where appropriate, life-jacket demonstration and use of "automatic drop-out" oxygen equipment) and restrictions of personal radio, tape recorder, handphones, laptop computers, etc in flight.

3.4.2 Who, in the absence of competent ground engineering staff, is responsible for supervising re-fuelling and ensuring that filler caps, re-fuelling valves, freight hold doors etc are secured.

3.4.3 Who, in the absence of competent traffic staff, is responsible for supervising the loading of the aircraft.

3.4.4 The duties of special personnel such as car marshallers and animal attendants.

3.4.5 The responsibility, when an APU is ground running and passengers are on board the aircraft, or are in the process of embarking or disembarking, for ensuring that there are satisfactory arrangements for cabin crew to be warned immediately of any APU emergency condition which might require the rapid evacuation of passengers from the aircraft.

3.4.6 The responsibility for taking precautions for the safety of passengers when they are permitted to embark, disembark or to remain on board during fuelling operations. There should be a nominated qualified person in attendance who shall be ready to initiate and direct an evacuation of the aircraft by the most practical and expeditious means available. Two-way communications shall be maintained by the aircraft's intercommunication system or other suitable means between the ground crew and supervising and qualified personnel on board the aircraft.

3.4.7 The responsibility for ensuring correct completion of the Technical Log, day to day servicing and any pre-flight maintenance checks, ground de-icing and anti-icing operational procedures and checks before flight or any other special pre-flight servicing, i.e. when a flight is to be planned or expected to operate in suspected or known ground icing conditions, the flight shall not commence unless the aircraft has been inspected for icing and, if necessary, has been given appropriate de/anti-icing treatment. Accumulation of ice or other naturally occurring contaminants shall be removed so that the aircraft is kept in an airworthy condition prior to take-off.

3.4.8 Limitations on the extent to which pilots and flight engineers may be allowed to operate on more than one aircraft type or variant.

3.5 Special consideration should be given to instructions on the arrangement of flight deck duties between the members of the flight crew, succession of command, the procedures for double checking altimeter settings, and the selection and identification of radio aids. The risk of confusion or a serious oversight can be eliminated only if suitable routine procedures are laid down and meticulously observed both in training and in the course of normal operations. Operators are therefore required to specify such procedures in detail, with particular reference to the division of duties during take-off, en-route and in the execution of an instrument approach procedure and "go around" in IMC, and to give them special emphasis in all training and periodical tests. The procedure for instrument approach in IMC in multi-crew aircraft should relieve the pilot-in-command of as much of the workload as possible, and through a proper division of duties and monitoring functions throughout the descent provide adequate safeguards against error or omission. The difficulty of transition from instruments in poor visibility should be taken fully into account, together with the need for a clear and systematic procedure for initiating "go-around" if there is any doubt about the advisability of continuing the approach by visual reference to the ground.

3.6 The division of duties between members of the crew in normal and emergency situations have to be promulgated. The division of duties between crew members in an emergency evacuation is discussed in paragraph 14 below.

4 FATIGUE RISK MANAGEMENT OF CREW

4.1 Subject to the provisions of the ANO, it is the responsibility of the operator to establish a fatigue risk management scheme appropriate to the nature of the flight operations.

4.2 Comprehensive guidance and instructions must be included in the manual for the benefit of both crew and those members of the operating staff who are concerned with rostering and scheduling. It may be necessary to issue one set of instructions for crew and a separate, more detailed set for other operating staff.

4.3 Factors to be taken into account in producing these instructions, and the nature of the limitations to be specified are contained in Appendix C and C1. Any variation to the limitations detailed in Appendix C and C1 requires approval by the Authority. Any variation agreed upon in this manner shall be in relation to particular schedules and duty periods. It is not permissible for such variations to be reflected in the operator's general instructions on flight, duty and rest periods. Requests for such variations should be made to the Authority in writing, giving full details of the adjusted fatigue management scheme and its corresponding risk assessment.

4.4 The extent to which a pilot-in-command is authorised in abnormal circumstances to exceed the operator's limitations on flight duty periods must be clearly defined in the manual. Instructions on this point should be as clear and concise as possible, so that pilots-in-command can readily determine the extent of their discretionary powers.

4.5 Instructions must include filing of reports by pilots-in-command or any crew members each time they exercise the discretion conferred upon them by the operator.

4.6 Instructions must be issued to crew covering abstention from alcoholic drinks for a suitable period prior to flight. The minimum acceptable period will be eight hours. Crew must also be advised of the precautions to be taken if they are undergoing medication

4.7 Responsibility within an operator's organisation for issuing instructions and making decisions on questions of flight, duty and rest periods and for processing discretion reports must be clearly defined and assigned to a member of the executive staff. The name of the person concerned, or the title of the office that he holds, must be included in the operations manual.

4.8 The operator is required to maintain and provide readily interpreted records for each aircraft crew member. It follows that there must be suitable arrangements for collecting the information necessary to compile the records. Accurate records are essential to persons responsible for the rostering of aircraft crew.

4.9 An operator approved for Ultra Long Range (ULR) operation shall regularly monitor and review its ULR operation with regards to flight time limitations and ULR training requirements as specified in Appendix C and Chapter 4. The form and manner of such monitoring and review are subject to the approval of the Authority.

4.10 An operator shall not implement a Fatigue Risk Management System (FRMS) except in accordance with the requirements in Appendix C and C2.

5 TECHNICAL PARTICULARS OF AIRCRAFT

5.1 The operator shall provide, for each aircraft type operated, the "technical particulars of the aircraft" as part of the operational manual. The operator should take care to distinguish between specific information to be used in the course of flight operations and the more general basic information that a pilot might need to prepare for a technical type rating examination. If detailed descriptive matter is included as part of the manual, it should be in a separate volume. Information on the following matters, in particular, should be provided in a form suitable for use as an immediate reference in day-to-day operations:

5.1.1 Action to be taken in the kind of technical emergency or fault that cannot be covered by a set drill of vital actions. Information should be provided about the effect on essential systems and services of serious faults such as the loss of generated electrical power. Information to be provided will vary with the type of aircraft and together with the emergency drills, it should be in a readily identified section of the manual (e.g. on distinctively coloured pages).

5.1.2 Procedure for pre-departure inspection as required by the maintenance schedule including a check of the fuel system for water content.

5.1.3 Replenishment of the aircraft's fuel, oil, coolant, hydraulic fluid, de-icing and water methanol supplies to an approved specification. Checking of accuracy of fuel uplift and total contents, particularly for operations in remote areas.

5.1.4 Supervising refueling and the topping up of tyres, oleos, de-icing and hydraulic systems, including oxygen and air reservoirs. The refueling information must include any specific precautions called for by:

(a) the use of wide cut fuels; and

(b) the "off aerodrome" situation where either a fuelling vehicle or a barrelled supply is used.

5.1.5 Calculation of critical airspeeds and mach numbers, variable thrust, and tail plane settings.

5.1.6 Maker's and/or operator's limitations affecting the handling of engines and pressurisation systems.

5.1.7 Procedure and precautions to be observed in order to jettison fuel.

5.1.8 Compliance with any special handling instructions.

5.1.9 Procedure and precautions to be observed in response to ACAS, GPWS and windshear alerts and warnings.

5.2 With regard to aircraft performance, in addition to complying with the requirements in paragraph 27, operators should normally provide their pilots-in-command with information and simplified data from which they can readily determine without reference to a Flight Manual or Performance Schedule the maximum weight at which they may take-off or land on a particular flight. The maximum weight referred to is that resulting from the statutory weight and performance requirements, or limitations such as zero fuel weight contained in the Flight Manual. In many cases (on regular or scheduled operations) it would only be necessary to indicate that there was no restriction under the performance requirements; in others it might be necessary to indicate which of the requirements is critical and to provide a tabular or other clear presentation of limiting weights in varying environmental conditions such as wind and temperature. There would also be instances in which it would be both practicable and desirable for the operator to indicate any special flight procedures – such as minimum height for setting course in IMC or emergency turn after take-off in the event of engine failure – essential to secure compliance with the performance requirements in relation to the obstacle clearance data provided in the Aerads, Jeppesen or any other charts approved by the Authority or by the State of the Aerodrome.

Note: As standard instrument departure (SID) routes do not guarantee adequate terrain clearance for all aircraft in the engine out case, the operator shall have checked that the performance requirements are met for all SIDs used by the company aircraft. Similarly, any emergency turn after take-off onto routes contained in the aircraft's operations manual, and approved for use by the local air traffic control, must also have been checked for compliance with the performance requirements.

5.3 Information should also be given on the following points:

5.3.1 Landing or take-off on runways affected by water, snow, slush or ice, with particular reference to techniques, the additional distances required and the crosswind limitations.

5.3.2 Allowances to be made for the effect of varying surface conditions where grass strips are used.

5.3.3 Crosswind limits for take-off and landing. It is not sufficient to repeat a statement in a flight manual that a particular crosswind component has been found to be acceptable; operators' limitations should be stated in unequivocal terms. In gusty conditions, the limit shall apply to the mean of the reported steady wind and reported gusts. Limits in excess of any figure mentioned in the flight manual will not be acceptable. Lower limits must be stated for use on a contaminated runway and where appropriate for landing with control, steering, or retarding systems not fully serviceable or following an engine failure.

5.3.4 Minimum strip widths to be available after the clearance of snow, together with the maximum height of associated snow banks.

5.3.5 For light aircraft, maximum permissible wind velocities for taxiing, take-off and landing.

5.3.6 Allowances to be made for the effect of unserviceable devices such as flaps, reversers, air brakes, etc.

5.3.7 Drift-down procedures to be followed on specific routes after failure of an engine, if the aircraft's stabilising altitude is likely to be critical in terms of safety height: further guidance on the subject is at Appendix E.

5.3.8 Special handling techniques and/or routing procedures resulting from noise abatement regulations related to particular airfield and runways. The noise abatement procedures specified for any one aeroplane type should be the same for all aerodrome, unless otherwise approved by the Authority: further guidance on this subject is at Appendix F.

5.3.9 Instructions on the conditions under which ferry flights with one engine inoperative can be undertaken, with details of the procedures to be followed.

Note: In respect of any operating conditions for which no relevant data is provided in the flight manual or performance schedule, it is more important that the operator seeks information and approval of the data to be used from the Authority.

5.4 A statement should be included in the manual to the effect that simulated instrument flight, and the simulation of emergency situations which might affect the flight characteristics of the aircraft, are prohibited on passenger or cargo carrying flights.

5.5 The Operations Manual shall include such particulars of any permission granted to the operator pursuant to paragraph 14 of the ANO as may be necessary to enable the pilot-in-command of the aircraft to determine whether the requirements in paragraph 31 (b)(ii) of the ANO can be compiled with.

6 FUEL FORMULA AND MANAGEMENT

6.1 Aeroplanes – Fuel Planning

6.1.1 A flight shall not commence unless the usable fuel on board meets the requirements in 6.2.1 a), b), c), d), e), f) and 6.2.2, if required and shall not continue from the point of in-flight re-planning (re-dispatch) unless the usable fuel on board meets the requirements in 6.2.1 b), c), d), e), f) and 6.2.2, if required.

6.1.2 To ensure departure with sufficient fuel for the flight and adequate reserves the Standard Fuel Formula in paragraph 6.2 must normally be followed. In special circumstances and under certain conditions alternate formulae may be used, as detailed in paragraph 6.3, (Minima Fuel Reserves) paragraph 6.4, (Planning on an Alternative Destination with Re-despatch in Flight) and 6.5 (Island Hold) of this chapter. Variation to pre-flight fuel calculations may be granted by the Authority in accordance with paragraph 6.5A of this chapter.

6.1.3 Whichever formula is used, allowance should be made for, as appropriate:

(a) auxiliary power unit;

(b) operation of systems such as de-icing which affect fuel consumption;

(c) a congested air traffic area where delays are likely;

(d) airfield where there is a need to climb to or descend from the en-route safety altitude whilst in the vicinity of the airfield;

(e) accuracy of the aircraft fuel gauges.

6.1.4 The amount of usable fuel to be carried shall, as a minimum, be based on:

(a) current aeroplane-specific data derived from a fuel consumption monitoring system or such current aeroplane-specific data is not available, data provided by the aeroplane manufacturer; and

(b) the operating conditions for the planned flight including:

(i) anticipated aeroplane mass;
(ii) Notices to Airmen;
(iii) current meteorological reports or a combination of current reports and forecasts;
(iv) air traffic services procedures, restrictions and anticipated delays; and
(v) the effects of deferred maintenance items and/or configuration deviations.

6.1.5 There should be instructions and guidance on the effect on fuel consumption of engine or system failure.

6.1.6 Where necessary requirements for oil, water methanol, etc as well as fuel should be specified.

6.1.7 Pilots-in-command must be allowed to carry more than the minimum fuel, at their discretion.

6.2 Standard Fuel Formula

6.2.1 The pre-flight calculation of usable fuel required shall include:

(a) start-up and taxi fuel: which shall be the amount of fuel expected to be consumed before take-off taking into account local conditions at the departure aerodrome and auxiliary power unit (APU) fuel consumption, and may be expressed in standard fixed amount;

(b) trip fuel, which shall be the fuel to destination comprising fuel to enable the aircraft to take-off, climb, cruise, descent, approach and land at the destination aerodrome taking into account the operating conditions of 6.1.4;

(c) contingency fuel, which shall be the amount of fuel required to compensate for unforeseen factors. It shall be 5 per cent of the planned trip fuel or of the fuel required from the point of re-planning but in any case shall not be lower than the amount required to fly for five minutes at holding speed at 450 m (1500 ft) above the destination aerodrome in standard conditions;

Note.— Unforeseen factors are those which could have an influence on the fuel consumption to the destination aerodrome, such as deviations of an individual aeroplane from the expected fuel consumption data, deviations from forecast meteorological conditions, extended delays before take-off, and deviations from planned routings and/or cruising levels.

(d) destination alternate fuel which shall be:

(i) where a destination alternate aerodrome is required, the amount of fuel required to enable the aeroplane to:
(1) perform a missed approach at the destination aerodrome;
(2) climb to the expected cruising altitude;
(3) fly the expected routing;
(4) descend to the point where the expected approach is initiated; and
(5) conduct the approach and landing at the destination alternate aerodrome; or

(ii) where two destination alternate aerodromes are required, the amount of fuel, as calculated in paragraph 6.2.1 (d) (i), required to enable the aeroplane to proceed to the destination alternate aerodrome which requires the greater amount of the alternate fuel.

(e) destination alternate contingency fuel; normal 5% of (d); and

(f) final reserve fuel, which shall be the amount of fuel calculated using the estimated mass on arrival at the destination alternate aerodrome or the destination aerodrome when no destination alternate is required:

(i) for a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes, under the appropriate speed and altitude; or

(ii) for a turbine engine aeroplane, the amount of fuel required to fly for 30 minutes at holding speed at 450 m (1500 ft) above aerodrome elevation in standard conditions.

6.2.2 The operator shall ensure that the aeroplane has additional fuel as supplementary fuel if the minimum fuel calculated in accordance with 6.2.1 (b), (c), (d), (e) and (f) is not sufficient to:

(a) allow the aeroplane to descend as necessary and proceed to an alternate aerodrome in the event of engine failure or loss of pressurisation, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route

(i) fly for 15 minutes at holding speed at 450 m (1 500 ft) above aerodrome elevation in standard conditions; and

(ii) make an approach and landing;

(b) allow an aeroplane engaged in EDTO to comply with the EDTO critical fuel scenario as established by the Authority;

(c) meet any other situations that may require additional fuel.

6.2.3 The pilot-in-command may determine the discretionary fuel, which shall be the extra amount of fuel to be carried onboard.

Note 1: Fuel planning for a failure that occurs at the most critical point along a route (6.2.2(a)) may place the aeroplane in a fuel emergency situation based on 6.6.1.

Note 2: To cater for very short sectors, and for alternates which are close to the destination, operators should specify a minimum contingency fuel and a minimum diversion fuel. For long haul operations and with Authority approval, the contingency fuel may be capped at a maximum value.

Note 3: Operators should determine one final reserve fuel value for each aeroplane type and variant in their fleet rounded up to an easily recalled figure.

6.3 **Minimum Fuel Reserves**

6.3.1 If the weather forecast for the destination gives a reasonable certainty that the landing may be made under visual meteorological conditions, the final reserve fuel, destination alternate fuel and destination alternate contingency fuel in paragraph 6.2.1 (d), (e) and (f) may be replaced by minimum fuel reserve comprising either:

(a) alternate fuel from decision height at destination to landing at alternate (6.2.1 (d)) plus 5% contingency(6.2.1(e); or

(b) 60 minutes holding fuel at 450m (1500ft) above destination aerodrome elevation

whichever is the greater.

6.3.2 The minimum fuel reserves contained in paragraph 6.3.1 may only be permitted provided that:

(a) the operator has specified appropriate weather minima; and

(b) the destination aerodrome must have at least two independent runways available and suitable for landing; and

(c) the operator prohibits the use of Minimum Fuel Reserves to destinations which pose special problems.

6.4 **Planning on an Alternative Destination with Re-despatch in Flight**

6.4.1 For planning an alternate destination with re-despatch in flight:

(a) the trip fuel in paragraph 6.2.1(b) shall comprise:

(i) fuel from take-off including climb and cruise to the in-flight re-despatch (re-planning) point; and

(ii) fuel from the in-flight re-despatch point to landing at the final destination.

(b) the contingency fuel in paragraph 6.2.1(c) may be reduced to 5% of the planned fuel burn from the in-flight re-despatch (re-planning) point to the final destination, but not below the operator's stated minimum contingency fuel.

6.4.1A The total fuel load calculated for paragraph 6.4.1 shall be increased if necessary to not less than the fuel load needed for flight to the alternate destination, calculated in accordance with paragraph 6.2 or paragraph 6.3.

6.4.2 The alternate destination must be available for landing at the appropriate time, and its weather forecast must allow a technical stop to be made.

6.5 **Island Hold**

6.5.1 Where because the destination is geographically isolated, there is no usable alternate aerodrome, items (d), (e) and (f) of paragraph 6.2.1 may be replaced by a holding reserve related to statistical data on local weather conditions. The minimum acceptable will be:

(i) for a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes plus 15 per cent of the flight time planned to be spent at cruising level, including final reserve fuel, or two hours, whichever is less; or

(ii) for a turbine engine aeroplane the amount of fuel required to fly for two hours at normal cruise consumption above the destination aerodrome, including final reserve fuel.

Such aerodromes are to be listed in the operations manual.

6.5A Variation to Pre-flight fuel Calculations

6.5A.1 Notwithstanding the provisions in 6.2.1(a), (b), (c), (d), (e) and 6.2.2, the Authority may, based on the results of a specific safety risk assessment conducted by the operator which demonstrates how an equivalent level of safety will be maintained, approve variations to the pre-flight fuel calculation of taxi fuel (6.2.1(a)), trip fuel (6.2.1(b)), contingency fuel (6.2.1.(c)), destination alternate fuel (6.2.1(d)), destination alternate contingency fuel (6.2.1(e)) and additional fuel (6.2.2). The specific safety risk assessment shall include at least the:

(a) flight fuel calculations;

(b) capabilities of the operator to include:

(i) a data-driven method that includes a fuel consumption monitoring programme; and/or

(ii) the advanced use of alternate aerodromes; and

(c) specific mitigation measures.

Note.— Guidance for the specific safety risk assessment, fuel consumption monitoring programmes and the advanced use of alternate aerodromes is contained in the Flight Planning and Fuel Management Manual (Doc 9976).

6.5A.2 The operator shall re-analyse and, if applicable, adjust the planned operation if fuel is used after commencement of flight for purposes other than originally intended during pre-flight planning.

Note.— Guidance on procedures for in-flight fuel management including re-analysis, adjustment and/or re-planning considerations when a flight begins to consume contingency fuel before take-off is contained in the Flight Planning and Fuel Management Manual (Doc 9976).

6.6 **Aeroplanes – In flight Fuel Management**

6.6.1 An operator shall establish policies and procedures, approved by the Authority, to ensure that in-flight fuel checks and fuel management are performed.

6.6.2 The pilot-in-command shall continually ensure that the amount of usable fuel remaining on board is not less than the fuel required to proceed to an aerodrome where a safe landing can be made with the planned final reserve fuel remaining upon landing. The records required by these instructions should be retained for at least three months.

Note.— The protection of final reserve fuel is intended to ensure a safe landing at any aerodrome when unforeseen occurrences may not permit safe completion of an operation as originally planned. Guidance on flight planning including the circumstances that may require re-analysis, adjustments and/or re-planning of the planned operation before take-off or en-route, is contained in the Flight Planning and Fuel Management Manual (Doc 9976).

6.6.3 When an aircraft has been despatched under paragraph 6.4 a decision must be made at or before decision point whether to land at the alternate destination or re-dispatch to the final destination. The manual must contain instructions that the aircraft may only be re-dispatched if the fuel on board is sufficient to reach the final destination (6.2.1 (b)) with contingency fuel (6.2.1 (c), destination alternate fuel (6.2.1 (d)), destination alternate contingency fuel (6.2.1(e)) and final reserve fuel (6.2.1(f)) as per paragraph 6.2 calculation, or fuel sufficient to reach the final destination (6.2.1(b) and contingency fuel (6.2.1(c)) with reserves of paragraph 6.3.1 if all the conditions of paragraph 6.3.2 are met.

6.6.4 The manual must state that in the event of a diversion, the fuel on-board shall be sufficient for the aircraft to arrive at the alternate with at least final reserve fuel (6.2.1(f)) upon landing.

6.6.5 When any abnormal fuel procedure is used in flight, the pilot-in-command must be informed and at least two crew members must monitor the operation.

6.6.6 Instructions may be included in the manual to allow crew to continue a flight to a destination when normal reserve fuel will no longer be available. Safeguarding conditions associated with those instructions shall include:

(a) such a decision to continue should only be made when one hour or less from the destination and when close to a usable en-route aerodrome; and

(b) the usable fuel remaining must be sufficient to fly to the destination aerodrome, make an approach with at least final reserve fuel (6.2.1(f)) upon landing; and

(c) the actual and forecast meteorological conditions at the destination shall permit a visual approach to landing until one hour after ETA. Account of any significant crosswind on the runway should also be considered; and

(d) there are no known or probable ATC delays for the period from ETA to ETA plus one hour; and

(e) there are at least two independent runways available and suitable for landing.

6.6.7 The pilot-in-command shall request delay information from ATC when unanticipated circumstances may result in landing at the destination aerodrome with less than the final reserve fuel plus any fuel required to proceed to an alternate aerodrome or the fuel required to operate to an isolated aerodrome.

6.6.8 The pilot-in-command shall advise ATC of a minimum fuel state by declaring MINIMUM FUEL when, having committed to land at a specific aerodrome, the pilot calculates that any change to the existing clearance to that aerodrome may result in landing with less than planned final reserve fuel.

Note 1. — The declaration of MINIMUM FUEL informs ATC that all planned aerodrome options have been reduced to a specific aerodrome of intended landing and any change to the existing clearance may result in landing with less than planned final reserve fuel. This is not an emergency situation but an indication that an emergency situation is possible should any additional delay occur.

Note 2. — Guidance on declaring minimum fuel is contained in the Flight Planning and Fuel Management Manual (Doc 9976).

6.6.9 The pilot-in-command shall declare a situation of fuel emergency by broadcasting MAYDAY MAYDAY MAYDAY FUEL, when the calculated usable fuel predicted to be available upon landing at the nearest aerodrome where a safe landing can be made is less than the planned final reserve fuel.

Note 1. — The planned final reserve fuel refers to the value calculated in 6.2.1(f)(i) or (ii) and is the minimum amount of fuel required upon landing at any aerodrome.

Note 2. — The words "MAYDAY FUEL" describe the nature of the distress conditions as required in Annex 10, Volume II, 5.3.2.1, b)3.

Note 3. — Guidance on procedures for in-flight fuel management are contained in the Flight Planning and Fuel Management Manual (Doc 9976)

7 USE OF OXYGEN AND PROVISION OF EQUIPMENT

7.1 Sufficient information should be included to enable the pilot-in-command to verify that adequate oxygen and associated equipment are carried to meet the requirements as specified in Scales K1 and K2 in the Fifth Schedule of ANO and to guide the crew on its use and the circumstances for the continued use of oxygen.

7.2 If oxygen is not carried, instructions should be included on restriction of operating heights.

8 CHECK LISTS

8.1 The operator shall establish the use of checklists as an integral part of the organisation's standard operating procedures (SOPs). Flight crew shall be instructed on the use of these checklists.

8.2 The drills and checks to be followed in the operation of the aircraft, including those for non-normal or emergency conditions, should be listed in full in the manual – preferably in a separate volume. Emergency equipment checklists and instructions on their use should also be provided. The pilot-in-command shall ensure that the checklists are complied with. The design of the checklists shall observe human factors principles.

8.3 There should be items in the normal drill requiring the pilot-in-command to brief other flight crew members on the following matters:

8.3.1 Prior to take-off:

(a) the actions to be taken in the event of an emergency arising during or immediately after take-off;

(b) any special requirements for take-off in crosswinds and on wet or otherwise contaminated runways;

(c) noise abatement procedures;

(d) selection of radio aids.

8.3.2 Prior to landing:

(a) selection of radio aids;

(b) missed approach procedures;

(c) any special handling or systems requirements for landing;

(d) selected alternate for diversion.

Note: It is not suggested that these items should be included in checklists in detail; if suitable instructions are provided elsewhere, the word 'briefing' will be sufficient at the appropriate points in the lists.

8.4 Checklists will not be acceptable unless they include detailed requirements for the setting and cross checking of altimeters for all phases of flight. There should also be an item in the normal drills requiring minimum safe altitudes to be checked before descending from cruising level.

8.5 Examples of emergency drills to be covered in checklists are:

(a) engine failure;

(b) engine fire and severe engine damage;

(c) propeller malfunction;

(d) failure of normal feathering system;

(e) fuel filter icing;

(f) relighting of turbine engines;

(g) bus-bar and other serious electrical failures;

(h) malfunction of power control systems;

(i) pressurisation failure and emergency descent;

(j) cabin/hold fire;

(k) smoke removal;

(l) essential actions prior to commencement of emergency evacuation;

(m) hydraulic failures;

(n) brake overheat.

8.6 In aircraft operated by two pilots, checklists should be stowed so that they are available to both pilots. If this is not possible, separate drill cards or checklists should be provided for each pilot for use on the flight deck. If the flight crew includes a flight engineer or third pilot a separate checklist should be provided for his/her use. In "single pilot" aircraft, checklists should be supplemented by the placarding of vital actions for final approach and landing. Emergency drills should be clearly marked for immediate use and, on larger and more complex aircraft, they should preferably be given on a separate set of cards kept apart from other documents on the flight deck and immediately available. For cabin crew, details of their ditching, crash landing and emergency evacuation drills should be readily available in flight. This can be achieved either by issue to each member of the cabin crew of a copy of their emergency drills – which they should be required to carry with them - or by stowing the drill cards at appropriate positions in the cabin. All check lists or drill cards must be of a quality sufficient to withstand heavy wear and to remain in legible condition.

8.7 On multi-crew aircraft, the manual should contain clear instructions that checklists are always to be used. On single pilot aircraft, the operator may at his discretion allow in-flight drills to be carried out from memory. When an operator elects to adopt this procedure, he/she must, nevertheless, ensure that the aircraft is provided with a checklist which is readily available to the pilot. Memorised drills must be carried out strictly in accordance with the checklist and emergency drills must be verified as soon as possible by reference to the checklist.

8.8 Aeroplane search procedure checklist

8.8.1 The operator shall ensure that all aeroplanes carry a checklist of the procedures to be followed for that aeroplane type in searching for concealed weapons, explosives, or other dangerous devices when a well-founded suspicion exists that the aeroplane may be the object of an act of unlawful interference. The operator shall also support the checklist with guidance on the appropriate course of action to be taken should a bomb or suspicious object be found, and provide information on the least-risk bomb location specific to that aeroplane type.

8.9 **Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods Doc 9481, N/928**

8.9.1 Operators shall ensure that all aeroplanes carry a copy of the " ICAO 9481 N/928" emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods to assist the crew to deal with any dangerous incident occurring on board the aircraft during flight.

8.9.2 Operators are required to provide a " Dangerous goods emergency response kit " for use aboard an aircraft and training crew members regarding its use. A typically dangerous goods emergency response kit contains:

(a) large, good quality polyethylene bags;

(b) bag ties; and

(c) long rubber gloves.

9 RADIO WATCH

9.1 The operator shall provide radio watch instructions to require a member of the flight crew to maintain a continuous watch on the emergency frequency 121.5 MHz and appropriate operational frequencies, to the extent possible.

10 ROUTE GUIDE

10.1 The route guide should be a volume or series of volumes separate from the rest of the operations manual. Aerad, Jeppesen or similar publications approved by the Authority will normally meet the requirement provided that flight crew are given adequate advice on the route to be followed. An operator providing his own guide should ensure that it meets the needs of crew in every respect. If flights are to be made only on airways or advisory routes (ADRs), it will be sufficient to include instructions to that effect; otherwise routes regularly flown should be specified in detail, normally on prepared navigation flight plans. For other flights, routes should be specified in a pilot-in-command's flight brief, a copy being retained at base. Operators are not required to lodge copies of standard Aerad or Jeppesen flight guides with the Authority.

10.2 Particular care should be taken to ensure that adequate information is provided on; search and rescue facilities, obstructions in the approach pattern, radio failure procedures, prohibited and danger areas, standard TMA routings, seasonal meteorological conditions, ATC communications and navigational facilities and procedures associated with the route along the route(s) and applicable procedures over heavily populated areas and areas of high traffic intensity, obstructions, physical layout, lighting, approach aids and arrival, departure holding and instrument approach procedures, and applicable operating minima. Only recognised instrument approach or let-down procedures in general use should normally be included in the flight guide. Exceptionally, a special "break cloud" procedure devised by the operator may be considered acceptable provided it has been approved by the appropriate airport authority. Proposals to use such special procedures, accompanied by the associated aerodrome operating minima, should be submitted for approval to the Authority.

10.3 Normally, the cancellation of IFR flight plans at night or in congested terminal areas should be prohibited, and instructions to this effect included in the manual. If an operator does not wish to impose a total prohibition, detailed instructions should be included in the manual setting out the minimum conditions that must be satisfied before cancellation of an IFR flight plan.

10.4 In order to facilitate effective monitoring of an instrument approach by members of the flight crew, operators of multi-crew aircraft should provide for use on the flight deck at least two copies of the instrument approach charts to be used.

11 METEOROLOGICAL AND VOLCANIC ACTIVITIES REPORTS FROM AIRCRAFT

11.1 The operator shall establish a policy and procedures for its flight crew to record and report meteorological observations and volcanic activity observed during flight.

11.2 The reporting of meteorological observations and volcanic activities should be based on information and guidance provided in the Singapore AIP and/or in the publications issued by the foreign authorities responsible for the airspaces through which the flight is flown.

11.3 The operator shall require its flight crew to report special observations of the following conditions encountered or observed during climb out and approach:

(a) moderate or severe turbulence; or

(b) moderate or severe icing; or

(c) severe mountain wave; or

(d) thunderstorms, without hail, that are obscured, embedded, widespread or in squall lines; or

(e) thunderstorms, with hail, that are obscured, embedded, widespread or in squall lines; or

(f) heavy duststorm or heavy sandstorm; or

(g) volcanic ash cloud; or

(h) pre-eruption volcanic activity or a volcanic eruption.

Note. — Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

11.4 Special aircraft observations of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud shall be recorded on the special Air-Report of Volcanic Activity form. A copy of the form shall be delivered by the operator or the flight crew member, without delay, either personally or by telephone facsimile (TEL: 6542 5026) to the Meteorological Office, Singapore Changi Airport.

12 MINIMUM SAFE ALTITUDES

12.1 The minimum safe altitude must be prescribed by the operator for each sector of each route to be flown – including routes to "alternate" aerodromes. For this purpose "sector" means the intended track from one reporting or turning point to the next, until the aircraft starts the instrument approach procedure (or joins the traffic pattern) at the aerodrome to be used for landing. Except as provided in paragraph 12.2 below, these figures must be specified by the operator prior to flight – in the appropriate volume of the manual, in a prepared navigational flight plan, or in the pilot-in-command's flight brief (see Chapter 5 paragraphs 11 and 12).

12.2 To meet the needs of the pilot-in-command when he/she is obliged to depart from the planned or normal route, operators must include in the manual instructions from which the minimum flight altitude can readily be determined.

12.3 In specifying minimum flight altitude, operators must take account of any local regulations and limitations. Such minimum altitudes shall not be lower than any which may be applicable under the law of Singapore or of the countries whose territory is to be flown over. The instructions should include maintenance of altitude awareness and the use of automated or flight crew altitude or flight crew call-out; the use of auto-pilot and auto-throttles in IMC; the clarification and acceptance of ATC clearances, particularly where terrain clearance is involved. Operators must specify limitations on high rate of descent near the surface.

12.4 The criteria upon which minimum altitudes are based will necessarily be determined to some extent by the track guidance facilities available to the pilot-in-command, and by the extent to which pilots-in-command and operators are able in particular circumstances to accept the directions of radar controllers. The minimum acceptable standards will normally be as follows (see paragraph 12.5 of this chapter):

12.4.1 For general application: 1,500 feet above the highest terrain or obstacle within 20 n.m. of the intended track, with additional provision where necessary for terrain or obstacles within 10 degrees of intended track from the last known position.

12.4.2 For flight in controlled airspace where the track is well defined by two separate aids: 1,500 feet above the highest terrain or obstacle within 10 n.m. of the intended track.

12.4.3 For radar controlled flight within 25 n.m. of the aerodrome of departure or intended landing: 1,000 feet above the highest terrain or obstacle within 5 n.m. of the intended track. Pilots-in-command should be instructed to monitor all radar instructions by reference to other aids and be reminded that radar control does not relieve them of their responsibility to ensure adequate terrain clearance.

12.4.4 If the specified minimum altitude for a sector is related only to terrain or obstacles within less than 20 n.m. of the intended track, special attention must be drawn to the fact in manuals and prepared navigational flight plans supplied to flight crew.

12.5 For flights within 20 n.m. of terrain having an elevation exceeding 2,000 feet, operations manuals should provide for minimum altitude to be increased by at least the following amounts according to the wind speed at flight level:

Elevation of terrain	Windspeed in knots			
	0-30	31-50	51-70	Over 70
2,000 – 8,000 ft	500 ft	1,000 ft	1,500 ft	2,000 ft
Above 8,000 ft	1,000 ft	1,500 ft	2,000 ft	2,500 ft

12.6 The manual should also include a reference to the effect of mountain waves and instruct pilots-in-command to take suitable precautions when such conditions are reported or forecast.

12.7 Minimum altitude should be related where necessary to the ability of the aircraft to comply with the Weight and Performance requirements. i.e. all engines operating, single engine failure for 2 engine aircraft, 1 or 2 engine failure for 3 or 4 engine aircraft.

12.8 If an operator wishes to use the minimum safe altitudes provided in a recognised Flight Guide (Aerads, Jeppesen or any charts that are approved by the Authority) he/she must first check that the basis of the publisher's calculations will give at least an equal standard to that required by the above paragraphs. It may be necessary to promulgate a correction in the manual so that the required standard is achieved.

13 AERODROME OPERATING MINIMA

13.1 Operator requirement to establish aerodrome operating minima for each aerodrome to be used in operation.

13.1.1 The operator shall establish and document in the Operations Manual aerodrome operating minima for each aerodrome to be used in operations using Authority-approved method of determination of such minima. When specifying the Aerodrome Operating Minima, the operator shall not specify values lower than the appropriate values as specified by the State of the Aerodrome or values so determined by Aerad or Jeppesen or any other chart providers that are approved by the Authority. For the use of head-up displays (HUD) or enhanced vision systems (EVS) the Authority may consider allowing operations with lower visibilities than normally associated with the aerodrome operating minima.

13.1.2 In establishing the aerodrome operating minima which will apply to any particular operation, the operator shall take into full account the following:

i) the type, performance and handling characteristics of the aeroplane;

ii) the composition of the flight crew, their experience and competence;

iii) the dimension and characteristic of the runway which may be selected for use;

iv) the adequacy and performance of available visual and non-visual ground aids;

v) the equipment available on the aeroplane for the purpose of navigation and/or control of flight path during the approach to landing and the missed approach;

vi) the obstacle in the approach and missed approach areas and the obstacle altitude/height for the instrument approach procedures;

vii) the means used to determine and report meteorological conditions; and

viii) the obstacles in the climb-out areas and necessary clearance margin.

Note.— Guidance on the establishment of aerodrome operating minima is contained in the Manual of All-Weather Operations (Doc 9365)

13.1.3 Instrument approach operations shall be classified based on the designed lowest operating minima below which an approach operation shall only be continued with the required visual reference as follows:

(a) Type A: a minimum descent height or decision height above 75 m (250 ft); and

(b) Type B: a decision height below 75 m (250 ft) . Type B instrument approach operations are categorised as:

(i) Category I (CAT I): a decision height not lower than 60 m (200 ft) and with either a visibility not less than 800 m or a runway visual range not less than 550 m;

(ii) Category II (CAT II): a decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft) and a runway visual range not less than 300 m;

(iii) Category IIIA (CAT IIIA): a decision height lower than 30 m (100 ft) or no decision height and a runway visual range not less than 175 m;

(iv) Category IIIB (CAT IIIB): a decision height lower than 15 m (50 ft) or no decision height and a runway visual range less than 175 m but not less than 50 m;

(v) Category IIIC (CAT IIIC): No decision height and no runway visual range limitations.

Note 1: Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach operations would be conducted in accordance with the requirements of the most demanding category (e.g. an operation with a DH in the range of CAT IIIA but with an RVR in the range of CAT IIIB would be considered a CAT IIIB operation or an operation with a DH in the range of CAT II but with an RVR in the range of CAT I would be considered a CAT II operation).

Note 2: The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path, In the case of circling approach operation the required visual reference is the runway environment.

Note 3: Guidance on approach classification as it relates to instrument approach operations, procedures, runways and navigation systems are contained in the All Weather Operations Manual (Doc 9365).

13.1.4 An instrument approach operation should not be authorised, when the aerodrome operating minima is below 800 m visibility unless RVR information is provided.

13.1.5 A CAT II and CAT III instrument approach operations shall not be authorised unless RVR information is provided.

13.1.6 The operating minima for 2D instrument approach operations using instrument approach procedures shall be determined by establishing a minimum descent altitude (MDA) or minimum descent height (MDH), minimum visibility and, cloud conditions.

Note.— For guidance on applying a continuous descent final approach flight technique on non-precision approach procedures refer to PANS-OPS (Doc 8168) Volume I, Section 1.7.

13.1.7 The operating minima for 3D instrument approach operations using instrument approach procedures shall be determined by establishing a decision altitude (DA) or decision height (DH) and the minimum visibility or RVR.

13.1.8 Operations with lower visibilities than normally associated with the aerodrome operating minima may only be allowed on aircraft with HUD and/or EVS if approval has been obtained in accordance with paragraph 13.12.2.

13.1A **Threshold crossing height for 3D instrument approach operations**

13.1A.1 An operator shall establish operational procedures designed to ensure that an aeroplane being used to conduct 3D instrument approach operations crosses the threshold by a safe margin, with the aeroplane in the landing configuration and attitude.

13.2 The Operations Manual instructions must comply with the relevant regulations and any mandatory operating minima which foreign countries may apply or authorise.

13.3 A flight shall not be continued towards the aerodrome of intended landing, unless the latest available information indicates that at the expected time of arrival, a landing can be effected at the aerodrome or at least one destination alternate aerodrome, in compliance with the operating minima established in accordance with paragraph 13.1.

13.4 Minima and associated instructions must be related as necessary to particular types of aircraft, and must be tabulated or otherwise presented in a manner that will facilitate immediate reference on the flight deck.

13.5 Runways (or landing strips) and approach aids which are not to be used (e.g. because the runway is too short) must be clearly indicated. This may be done in the operator's weather minima tables or by a general instruction prohibiting the use of runways or aids which are not included in the tables.

13.6 For guidance of pilots-in-command who may be obliged in exceptional circumstances to land at aerodrome for which values have not been specified, operators should include in the Operations Manual the data and instructions by means of which minima appropriate to the circumstances can readily be calculated. The guidance given should be sufficient to enable the pilot-in-command to determine all the values that would normally have been specified by the operator including, in particular, the minima appropriate to visual manoeuvring for landing. When a pilot-in-command calculates the Aerodrome Operating Minima (AOM) in accordance with these criteria the calculations should be retained with other flight documentation.

13.6A Operations with lower visibilities than normally associated with the aerodrome operating minima may only be allowed on aircraft with HUD and/or EVS if approval has been obtained in accordance with paragraph 13.12.2.

13.7 **Selection of Alternate Aerodrome**

13.7.1 An operator shall establish procedures in the Operations Manual or in the flight brief for the pilot-in-command for the selection of destination and/or alternate aerodromes in accordance with 13.7.2 when planning a flight.

13.7.2 **Take-off Alternate Aerodrome**

13.7.2.1 An operator shall select and specify a take-off alternate aerodrome in the operational flight plan if either the meteorological conditions at the aerodrome of departure are below the operator's established aerodrome landing minima for that operation or if it would not be possible to return to the aerodrome of departure for other reasons.

13.7.2.2 The take-off alternate aerodrome shall be located within the following flight time distance from the aerodrome of departure:

(a) for aeroplanes with two engines, one hour of flight time at a one-engine-inoperative cruising speed, determined from the aircraft operating manual, calculated in ISA and still-air conditions using the actual take-off mass; or

(b) for aeroplanes with three or more engines, two hours of flight time at an all-engine operating cruising speed, determined from the aircraft operating manual, calculated in ISA and still-air conditions using the actual take-off mass; or

(c) for aeroplanes engaged in extended diversion time operations (EDTO) where an alternate aerodrome meeting the distance criteria of a) or b) is not available, the first available alternate aerodrome located within the distance of the operator's approved maximum diversion time considering the actual take-off mass.

13.7.2.3 For an aerodrome to be selected as a take-off alternate the available information shall indicate that, at the estimated time of use, the conditions will be at or above the operator's established aerodrome operating minima for that operation.

13.7.3 **RESERVED**

13.7.4 Operators using Category II or Category III equipped aircraft should, at the flight planning stage consider the possibility of equipment malfunction, and ensure that the weather at the alternate aerodrome is Category I or better.

13.7.5 En-route alternate aerodrome

13.7.5.1 En-route alternate aerodromes required by paragraph 20 in this Chapter for extended diversion time operations by aeroplanes with two turbine engines, shall be selected and specified in the operational and air traffic services (ATS) flight plans.

13.7.6 Destination alternate aerodrome

13.7.6.1 For a flight to be conducted in accordance with the instrument flight rules, the operator shall select and specify at least one destination alternate aerodrome in the operational and ATS flight plans, unless:

(a) the duration of the flight from the departure aerodrome, or from the point of in-flight re-planning to the destination aerodrome is such that, taking into account all meteorological conditions and operational information relevant to the flight, at the estimated time of use, a certainty exists that:

(i) the approach and landing may be made under visual meteorological conditions; and

(ii) separate runways are usable at the estimated time of use of the destination aerodrome with at least one runway having an operational instrument approach procedure; or

(b) the aerodrome is isolated. Operations into isolated aerodromes do not require the selection of a destination alternate aerodrome(s) and shall be planned in accordance with paragraph 6.5 in this Chapter, plus contingency fuel of 5%.

(i) for each flight into an isolated aerodrome a point of no return shall be determined; and

(ii) a flight to be conducted to an isolated aerodrome shall not be continued past the point of no return unless a current assessment of meteorological conditions, traffic, and other operational conditions indicate that a safe landing can be made at the estimated time of use.

Note 1.— Separate runways are two or more runways at the same aerodrome configured such that if one runway is closed, operations to the other runway(s) can be conducted.

Note 2.— Guidance on planning operations to isolated aerodromes is contained in the Flight Planning and Fuel Management Manual (Doc 9976).

13.7.6.2 The operator shall select and specify two destination alternate aerodromes in the operational and ATS flight plans when, for the destination aerodrome:

(a) meteorological conditions at the estimated time of use will be below the operator's established aerodrome operating minima for that operation; or

(b) meteorological information is not available.

13.7.7 Notwithstanding the provisions in 13.7.2, 13.7.5, and 13.7.6; the Authority may, based on the results of a specific safety risk assessment conducted by the operator which demonstrates how an equivalent level of safety will be maintained, approve operational variations to alternate aerodrome selection criteria. The specific safety risk assessment shall include at least the:

(a) capabilities of the operator;

(b) overall capability of the aeroplane and its systems;

(c) available aerodrome technologies, capabilities and infrastructure;

(d) quality and reliability of meteorological information;

(e) identified hazards and safety risks associated with each alternate aerodrome variation; and

(f) specific mitigation measures.

Note.— Guidance on performing a safety risk assessment and on determining variations, including examples of variations, are contained in the Flight Planning and Fuel Management Manual (Doc 9976) and the Safety Management Manual (SMM) (Doc 0859).

13.8 **Take-off Minima**

13.8.1 Minima condition for take-off must be specified in terms of cloud ceiling and the runway visual range or visibility as appropriate. Full account should be taken of the factors in Part D of the Ninth Schedule to the ANO in particular the nature and position of runway lights and/or markings, the take-off run and emergency distance available, runway width and the directional controllability of the aircraft particularly in case of engine failure.

13.9 Special rules applicable to certain types of aircraft are discussed in paragraph 13.12.

13.10 Landing Minima

13.10.1 Decision height/altitude (DH, DA) or minimum descent height/altitude (MDH, MDA) and Runway Visual Range (RVR) and/or visibility must be specified for each runway or landing strip and approach aid to be used. Crew must be instructed:

(a) not to continue an approach below 300m (1000ft) above the aerodrome elevation or into the final approach segment unless the reported or controlling RVR is at or above the specified value;

(b) if, after entering the final approach segment or after descending below 300m (1000ft) above the aerodrome elevation the reported visibility or controlling RVR falls below the specified minimum, the approach may be continued to DA/H or MDA/H;

(c) to initiate a missed approach if the approach and landing from DH/DA or MDA/DH cannot be completed entirely by visual reference to the ground (see Note 2 in paragraph 13.1.3 of this Chapter); and

(d) that the procedure should ensure that the aircraft conducting a precision approach crosses the threshold by a safe margin in a landing configuration and attitude.

13.10.2 In deciding the values to be specified, operators shall be guided by the factors in Part D of the Ninth Schedule to the ANO. They must also take account of the relevant limitations notified by the appropriate aerodrome authority. Any altimeter system, and the amount of sink following initiation of a missed approach must be allowed for. The minimum acceptable RVR is related to decision height and to visual approach and runway aids (see Appendix B).

13.10.3 Operators must specify increments to be applied to the normal specified values in the event of any unserviceability of engine, system or instrumentation which significantly affects the performance and/or handling of the aircraft. Operators should also consider specifying increments to be applied by pilots-in-command with limited experience. All approaches should be conducted according to a stabilised approach procedure.

13.11 Minima for Visual Manoeuvring for Landing

13.11.1 Minima for visual manoeuvring for landing (circling minima) must be established by the operator for each aerodrome to be used. These minima shall consist of a minimum circling height and a minimum visibility. They would apply, for example, where a pilot used a radio aid to position himself in sight of the aerodrome and then made a partial circuit (or other significant manoeuvre) to line-up for the approach and landing.

13.11.2 The minimum height for circling should be determined by reference to the relevant chart or AIP and account must be taken of obstacles and terrain within the appropriate radius of the centre of the aerodrome. The radius used must be indicated in the manual.

13.11.3 At some aerodromes, it will be necessary to restrict circling to a particular area of the circuit – e.g. "north of the extended centreline only" – because of major obstacles or high ground in the vicinity. Any such restriction must be clearly indicated in the lists of operating minima.

13.11.4 For a visual circuit of the aerodrome based on visual manoeuvring minima, a pilot should have continuous sight of ground features which will enable him to establish the position of the aircraft in relation to the aerodrome and subsequently to remain within the notified visual manoeuvring area.

13.12 **Special Rules For Certain Aircraft**

13.12.1 Certain classes of aircraft which are less well equipped and/or have a limited engine-out performance capability will need to operate to higher weather minima. Such minima shall be submitted to the Authority for approval.

13.12.2 Where aircraft are equipped with HUD and/or EVS, such systems shall not be used to gain operational benefit unless approved by the Authority.

13.13 **Aerodromes without Approach Aids**

13.13.1 As a general rule for public transport aircraft carrying passengers, flights to aerodrome without a radio or radar approach aid are prohibited. This should be brought specially to the attention of crew in operations manuals. In exceptional circumstances flights to such aerodromes may be specially permitted, and suitable aerodrome operating minima, together with associated operating procedures, will be agreed with the operator.

14 EMERGENCY EVACUATION PROCEDURES

14.1 The manual should specify the procedures to be followed by the aircraft crew for the rapid evacuation of an aircraft, and the care of passengers, in the event of a forced landing, ditching or other emergency. Much of the material will necessarily be descriptive but it is essential that the basic drills to be followed by the various members of the aircraft crew should be summarised and tabulated. Particular attention should be paid to the following points:

(a) The correct setting for pressurisation controls – e.g. spill valves, safety valves, discharge valves – prior to ditching;

(b) The proper use of emergency escape chutes;

(c) The method of fitting life-jackets to small children;

(d) The briefing of passengers and warning of impact;

(e) The seating of aircraft crew members adjacent to exits which drills require them to open;

(f) Crowd control (particularly in relation to aircraft capable of carrying large numbers of passengers) including procedures for initiating and maintaining the rapid egress of passengers in the event of an emergency evacuation;

(g) The need to move passengers away from the vicinity of the aircraft after evacuation.

14.2 Clear instructions should be given in the manual (supplemented by simple diagrams) on the location and, where it is not self-evident, the method of use of each item of emergency and survival equipment such as escape chutes and ropes, exits, fire extinguishers, oxygen masks and smoke protection equipment, emergency lights, torches, first aid kits, dinghies, life-jackets, survival packs, emergency radio, and flotation cots. It is especially important that differences between individual aircraft of the same type are clearly shown.

14.3 Special consideration should be given to the problems posed by the carriage of disabled passengers and the possible need to carry additional cabin crew. The pilot-in-command should be made aware of the presence of severely disabled persons on board, and of the precautions taken to minimise the effect of their carriage on the conduct of an emergency evacuation of the aircraft.

14.4 Operators should ensure that there are satisfactory arrangements for cabin crew to be warned immediately of any emergency which might require the rapid evacuation of passengers from the aircraft.

14.5 To improve the chances of a successful evacuation, operators should back up the cabin crew briefing by paying special attention to the individual passenger notice cards, required by the ANO. It should be in colour, and pictorial, giving simply and unambiguously:

(a) instructions on the method of use of safety belts and harnesses;

(b) instructions on the brace position to be adopted in the event of an emergency landing;

(c) information as to where emergency exits are to be found and how to use them; and

(d) information on where life-jackets, escape slides, life rafts, oxygen masks are to be found and how to use them.

15 ALLOWABLE DEFICIENCIES AND MINIMUM EQUIPMENT LISTS

15.1 The operator shall provide guidance to pilots-in-command on whether and on what conditions aircraft may be operated with defect not rectified. The minimum equipment list for all specific operations including any requirements relating to operations in All Weather Operations (CAT II and CAT III), RNP, RNAV, MNPS, RVSM, EDTO and CNS/ATM airspace and any other special operation requirements shall be submitted to the Authority for approval.

Note : Further details and references on RNP/RNAV, MNPS and RVSM can be found in the following ICAO Document:

(a) RNP/RNAV – ICAO Doc 9613 (PBN);

(b) MNPS – NATS MNPS (North Atlantic MNPS Airspace Operations Manual); and

(c) RVSM – ICAO Doc 9574.

15.2 When the carriage of unserviceable equipment results in a deviation from the normal drills, satisfactory alternative drills must be included in the manual. It is important, when items such as spoilers or thrust reversers are listed as allowable deficiencies that the operator not only publishes alternative drills, but also checks with the Authority on the validity of relevant performance data.

16 USE AND CHECKING OF ALTIMETERS

16.1 Operators should provide detailed instructions in their operations manuals about altimeter setting procedures and in particular, about their policy regarding the use of QFE and QNH.

16.2 The instructions should include pre-flight serviceability checks, the settings to be used on each altimeter for each phase of flight, and the monitoring and cross-checking duties of flight crew during climb and descent and whenever a setting is changed.

16.3 In order to facilitate effective monitoring during the approach and landing phase in aircraft operated by two pilots, the Authority requires that both pilots' altimeters be set to the same datum unless otherwise approved by the Authority.

16.4 Guidance material on the use of altimeters is contained at Appendix D.

17 REPORTING OF ACCIDENTS, INCIDENTS AND OCCURRENCES

17.1 Operators and pilots-in-command of Singapore registered aircraft are required to report any accidents, incidents or occurrences which endangers, or unless corrected would have endangered the flight crew and passengers and aircraft. The list of reportable occurrences and the applicable reporting timelines are set out in Appendix Q. The manual should remind personnel of their responsibilities in this regard and state the company procedure for dealing with such reports.

17.2 Pilots-in-command are to report any hazardous conditions, other than those associated with meteorological conditions, to the appropriate aeronautical station as soon as possible. The reports so rendered shall give such details as may be pertinent to the safety of other aircraft.

17.3 The pilot-in-command shall be responsible for reporting all known or suspected defect in the aircraft to the operator at the termination of the flight in accordance with SAR Chapter 4.5.

18 DANGEROUS GOODS

18.1 The operations manual shall indicate whether or not an operator is authorised to carry dangerous goods as cargo by air and what conditions apply to that authorisation.

18.2 Operators that are authorised to transport dangerous goods by air must establish dangerous goods policies and procedures to meet the requirements of Annex 18, the Technical Instructions and the ANO to enable staff and its agents to:

(a) identify and reject undeclared or misdeclared dangerous goods, including COMAT classified as dangerous goods;

(b) report to the appropriate authorities of the State of the Operator and the State in which it occurred any;

(i) occasion when undeclared or misdeclared dangerous goods are discovered in cargo or mail; and

(ii) dangerous goods accident and incident;

(c) report to the appropriate authorities of the State of the Operator and the State of Origin any occasion when dangerous goods are discovered to have been carried;

(i) when not loaded, segregated, separated or secured in accordance with the Technical Instructions Part 7, Chapter 2; and

(ii) without information having been provided to the pilot-in-command;

(d) accept, handle, store, transport, load and unload dangerous goods, including COMAT classified as dangerous goods as cargo on board an aircraft; and

(e) provide the pilot-in-command with accurate and legible written or printed information concerning dangerous goods that are to be carried as cargo.

18.3 The conditions for the carriage of dangerous goods are covered in Chapter 3, paragraph 3.

18.4 Operators that are not authorised to transport dangerous goods by air must establish dangerous goods policies and procedures to meet the requirements of Annex 18, the Technical Instructions and the ANO to enable staff and agents to:

(a) identify and reject undeclared dangerous goods, including COMAT classified as dangerous goods; and

(b) report to the appropriate authorities of the State of the Operator and the State in which it occurred any;

(i) occasion when undeclared dangerous goods are discovered in cargo or mail; and

(ii) dangerous goods accident or incident.

19 GROUND HANDLING[2]

19.1 Operators are required to provide ground handling instructions, procedures and arrangements so that all ground handling despatch tasks are carried out in a standard manner.

19.2 In addition, instructions shall be provided to its staff on the requirement to monitor the performance of the contracted handling agents to ensure safe conduct of all tasks.

19.3 When all or part of the functions and tasks related to ground handling services have been contracted to a service provider, all ground handling responsibility must be still maintained by the operator.

19A OPERATIONS BEYOND 60 MINUTES TO AN EN-ROUTE ALTERNATE AERODROME

19A.1 All operators conducting operations beyond 60 minutes from a point on a route to an en-route alternate aerodrome shall ensure that:

(a) for all aeroplanes:

(i) en-route alternate aerodromes are identified; and
(ii) the most up-to-date information is provided to the flight crew on identified en-route alternate aerodromes, including operational status and meteorological conditions; and
(iii) the operation meets any other requirements that the Authority may stipulate from time to time.

(b) for aeroplanes with two turbine engines, the most up-to-date information provided to the flight crew indicates that conditions at identified en-route alternate aerodromes will be at or above the operator's established aerodrome operating minima for the operation at the estimated time of use.

19A.2 In addition to 19A.1, operators shall ensure that the following are taken into account and provide the overall level of safety acceptable to the Authority:

(a) operational control and flight dispatch procedures;

(b) operating procedures; and

(c) training programmes

Note.— Guidance on compliance with the requirements of this provision is contained in CAAS AC AOC–13.

[2] Ground handling includes services that are necessary for an aircraft's arrival at, and departure from, an airport, other than air traffic services.

20 EXTENDED DIVERSION TIME OPERATIONS (EDTO)

20.1 Unless the operation has been specifically approved by the Authority, an aeroplane with two or more turbine engines shall not, be operated on a route where the diversion time from any point on the route to an en-route alternate aerodrome exceeds threshold time of:

(a) 60 minutes for aeroplanes with two turbine engines; and

(b) 180 minutes for aeroplanes with more than two turbine engines

Note 1.— When the diversion time exceeds the threshold time, the operation is considered to be an extended diversion time operation (EDTO).

Note 2. — For the purpose of EDTO, the take-off and/or destination aerodromes may be considered en-route alternate aerodromes.

20.2 The maximum diversion time, for an operator of a particular aeroplane type engaged in extended diversion time operations shall be approved by the Authority.

20.3 An operator seeking maximum diversion time for a particular aeroplane type to engage in extended diversion time operations from the Authority, besides satisfying the requirements in paragraph 20.1, shall also ensure that:

(a) for all aeroplanes: the most limiting EDTO significant system time limitation, if any, indicated in the Aeroplane Flight Manual (directly or by reference) and relevant to that particular operation is not exceeded; and

(b) for aeroplanes with two turbine engines: the aeroplane is EDTO certified.

20.4 Notwithstanding the provisions in 20.3 a); the Authority may, based on the results of a specific safety risk assessment conducted by the operator which demonstrates how an equivalent level of safety will be maintained, approve operations beyond the time limits of the most time-limited system. The specific safety risk assessment shall include at least the:

(a) capabilities of the operator;

(b) overall reliability of the aeroplane;

(c) reliability of each time limited system;

(d) relevant information from the aeroplane manufacturer; and

(e) specific mitigation measures.

20.5 For aeroplanes engaged in EDTO, the additional fuel required by 6.2.2 (b) shall include the fuel necessary to comply with the EDTO critical fuel scenario as established by the Authority.

20.6 A flight shall not proceed beyond the threshold time in accordance with paragraph 20.1 unless the identified en-route alternate aerodromes have been re-evaluated for availability and the most up to date information indicates that, during the estimated time of use, conditions at those aerodromes will be at or above the operator's established aerodrome operating minima for the operation. If any conditions are identified that would preclude a safe approach and landing at that aerodrome during the estimated time of use, an alternative course of action shall be determined.

20.7 An operator approved to conduct operations where the diversion time is beyond the threshold time, shall ensure that the following are taken into account in providing the overall level of safety intended by the provisions of Singapore Airworthiness Requirements:

(a) reliability of the propulsion system;

(b) airworthiness certification for EDTO of the aeroplane type; and

(c) EDTO maintenance programme.

Note 1.— EDTO may be referred to as ETOPS in some documents.

Note 2. — Additional guidance is provided via relevant advisory circulars on the topic.

Note 3.— The Airworthiness Manual (Doc 9760) contains guidance on the level of performance and reliability of aeroplane systems as well as guidance on continuing airworthiness aspects.

20A MIXED FLEET FLYING OPERATIONS (MFF)

20A.1 Pursuant to paragraph 1(2) of the Ninth Schedule Part B of the ANO, a pilot shall be tested by the operator as to his competence to perform his duties in an aircraft of the type to be used for the flight, or in an aircraft of such other type used by the operator as approved by the Authority.

20A.2 For the purpose of paragraph 20A.1, an operator approved for MFF operations or intending to apply for MFF approval, shall meet the requirements for Mixed Fleet Flying as stipulated in Appendix V.

21 SPECIAL OPERATIONS

21.1 For the purpose of this AOCR, special operations include, but are not limited to, the following:

(a) MNPS – Minimum Navigation Performance Specification;

(b) RVSM – Reduced Vertical Separation Minimum;

(c) PBN – Performance-based Navigation, including:
 (i) RNAV – Area Navigation;
 (ii) RNP – Required Navigation Performance;
 (iii) BaroVNAV.

(d) Polar Routes;

(e) Data-link including:
 (i) CPDLC and ADS-C,
 (ii) ADS-B.

(f) AWO – All Weather Operations;

(g) Use of automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, or any combination of those systems into a hybrid system; or

(h) ULR - Ultra Long Range flights or

(i) PBCS – Performance-based Communication and Surveillance.

21.2 In addition to the requirements promulgated in paragraphs 13, 36, 36A, 36B and 36C of the ANO, no special operation shall be conducted, unless:

(a) the aircraft equipment is approved by the Chief Executive;

(b) the aircraft equipment is installed and maintained in a manner approved by the Chief Executive;

(c) the flight and ground crew are trained in accordance with policies and procedures approved by the Chief Executive; and

(d) the aircraft is operated in compliance with operational procedures approved by the Chief Executive; and

(e) the aircraft is operated in compliance with the procedures and restrictions promulgated by the relevant authorities of the airspace in which the aircraft is flying.

21.3 In addition to paragraph 21.2, an operator seeking RVSM operational approval shall comply with the requirements set out in Appendix R.

Note: Additional guidance is provided via relevant advisory circulars on the respective operations.

22 SECURITY PROGRAMME

22.1 The operator shall establish and implement a written security programme and shall ensure that such a programme meets the national civil aviation security programmes of all States to which it operates.

23 FLIGHT DECK SECURITY

23.1 From 1 November 2003, the operator shall not operate a passenger aeroplane with a maximum certificated take-off mass in excess of 45,500 kg or with a passenger seating capacity greater than 60 unless it is equipped with an approved flight deck door that is designed to resist penetration by small arms fire and grenade shrapnel, and to resist forcible intrusion by unauthorised persons.

23.2 In all aeroplanes equipped with a flight deck door required by paragraph 23.1, means shall be provided for pilots to monitor from either pilot's station the entire door area outside the flight deck to identify persons requesting entry to the flight deck and to detect suspicious behaviour or potential threat.

23.3 It is recommended that all other aeroplanes operated by the operator be installed with an approved flight deck door, where practicable, that is designed to resist penetration by small arms fire and grenade shrapnel, and to resist forcible intrusion by unauthorised persons.

23.4 In all aeroplanes equipped with a flight deck door recommended by paragraph 23.3, means should be provided for pilots to monitor from either pilot's station the entire door area outside the flight deck to identify persons requesting entry to the flight deck and to detect suspicious behaviour or potential threat.

23.5 If installed, the flight deck door shall be capable of being locked or unlocked from either pilot's station. Means shall be provided by which cabin crew can discreetly notify the flight crew in the event of suspicious activity or security breaches in the cabin.

23.6 The Pilot-in-command shall ensure that the flight deck door is closed from the time all external doors are closed following embarkation until any such door is opened for disembarkation, except when necessary to permit access and egress by authorised persons.

23.7 The flight deck door shall not be opened unless the person requesting access has been identified as a person authorised to access the flight deck.

24 ADMISSION TO THE FLIGHT DECK

24.1 The Pilot-in-command shall ensure that no person, other than a flight crew member assigned to a flight, is admitted to, or carried in, the flight deck unless the person is:

(a) A crew member in the performance of his or her duties;

(b) An Authorised Officer responsible for certification, licensing or inspection;

(c) A person required to be in the flight deck compartment for technical, operational, training, or official flight deck familiarisation reasons formally authorised in accordance with the operator's Operations Manual; and

(d) Any other persons or classes of persons as approved by the Authority to be admitted to the flight deck. The list of such persons or classes of persons shall be included in the Operations Manual.

24.2 The Pilot-in-command shall ensure that:

(a) In the interest of safety, admission into the flight deck does not cause distraction and/or interfere with the flight's operation; and

(b) All persons carried on the flight deck are made familiar with the relevant safety and security procedures.

24.3 The final decision regarding the admission to the flight deck shall be the responsibility of the Pilot-in-command.

25 CONTROL OF INFECTIOUS DISEASES[3]

25.1 Operators must have written procedures and guidelines available to all operating staff for the handling of any outbreak of infectious diseases at destination(s) to which operate.

25.2 Operators shall ensure that all operating staff are familiar with such procedures and guidelines related to the handling of outbreak of infectious diseases.

26 ELECTRONIC NAVIGATION DATA MANAGEMENT

26.1 The operator shall not employ electronic navigation data products that have been processed for application in the air and on the ground unless the operator's procedures have been approved by the Authority to ensure that:

(a) the process applied and the products delivered have met acceptable standards of integrity; and

(b) the products are compatible with the intended function of the equipment that will use them.

26.2 The operator must ensure that both the process and the products are continuously monitored to meet with the standards of integrity as provided in RTCA DO-200A / EUROCAE ED-76 and RTCA DO201A / EUROCAE ED-77.

26.3 The operator shall implement procedures that ensure the timely distribution and insertion of current and unaltered electronic navigation data to all aircraft that require it.

26A ELECTRONIC FLIGHT BAG (EFB)

26A.1 Subject to Paragraph 12(6) of the ANO, this paragraph contains the requirements for the installation of an EFB system.

Note: "Electronic Flight Bag (EFB)" refers to an electronic version of the typical paper-based "flight bag".

26A.2 An operational approval from the Authority shall be obtained prior to the operation of an EFB. An operator who wishes to use EFB, irrespective of the EFB being portable or installed as aircraft fixture(s), shall submit to the Authority for evaluation with regards to the airworthiness of the aircraft and operational approval of the EFB.

[3] As defined by World Health Organisation.

Note 1: Operations of EFB include the application of both hardware and software. EFB hardware is categorised into three classes each with defined scope and complexity of operation. Correspondingly EFB software is type-classified for different scope and level of application.

Note 2: Additional guidance is provided via relevant advisory circulars on EFB operations.

27 AEROPLANE PERFORMANCE OPERATING LIMITATIONS

Requirements for Large Aeroplanes

27.1 This section (paragraphs 27.1 to 27.8) applies to aeroplanes certificated with maximum total weight authorised greater than 5,700 kg operated by the operator.

27.2 The operator shall not permit a flight to be commenced unless the performance information provided in the flight manual, supplemented as necessary with other data acceptable to the Authority (including contaminated runway landing distance data, provided by the aeroplane manufacturer and acceptable to the Authority), indicates that the requirements of this section can be complied with for the flight to be undertaken.

27.3 In applying the requirements in this paragraph, the operator shall take into account all factors that significantly affect the performance of the aeroplane, including, but not limited to the weight of the aeroplane, the operating procedures, the pressure-altitude appropriate to the elevation of the aerodrome, the ambient temperature, the wind, the runway slope, and the surface conditions of the runway for landplanes and water surface condition for seaplanes. Such factors shall be taken into account directly as operational parameters or indirectly by means of allowances or margins which may be provided in the scheduling of performance data or in the comprehensive and detailed code of performance in accordance with which the aeroplane is being operated.

27.4 The operator shall ensure, for each aeroplane it operates, that:

(a) the weight at the start of its take-off is not greater than the weight necessary to comply with paragraph 27.5, allowing for expected reductions in weight as the flight proceeds, and for such fuel jettisoning or diversion as is envisaged in applying paragraph 27.6 and, in respect of alternate aerodromes, paragraphs 27.4 c) and 27.7;

(b) the weight at the start of take-off does not exceed the maximum take-off weight specified in the aeroplane flight manual for the pressure-altitude appropriate to the elevation of the aerodrome, and, if used as a parameter to determine the maximum take-off weight, any other local atmospheric condition;

(c) the estimated weight for the expected time of landing at the aerodrome of intended landing and at any destination alternate aerodrome does not exceed the maximum landing weight specified in the flight manual for the pressure-altitude appropriate to the elevation of those aerodromes, and if used as a parameter to determine the maximum landing mass, any other local atmospheric condition;

(d) the weight at the start of take-off, or at the expected time of landing at the aerodrome of intended landing and at any destination alternate aerodrome, exceed the relevant maximum weights at which compliance has been demonstrated with the applicable noise certification Standards in Volume I of Annex 16 to the Convention of International Civil Aviation, unless otherwise authorised in exceptional circumstances for a certain aerodrome or a runway where there is no noise disturbance problem, by the competent authority of the State of the Aerodrome.

27.5 **Take-off**.

The operator shall ensure, for each aeroplane it operates, that in the event of a critical engine failing, or for other reasons, at any point in the take-off, the aeroplane is able to either to discontinue the take-off and stop within the accelerate-stop distance available, or to continue the take-off and clear all obstacles along the flight path by an adequate vertical or horizontal distance until the aeroplane is in a position to comply with paragraph 27.6. When determining the resulting take-off obstacle accountability area, the operating conditions, such as the cross-wind component and navigation accuracy, must be taken into account. In determining the length of the runway available, the operator shall take into account the loss, if any, of runway length due to alignment of the aeroplane prior to take-off.

27.6 **En-route**.

The operator shall ensure, for each aeroplane it operates, that :

(a) in the event of the critical engine becoming inoperative at any point along the route or planned diversions there from, the aeroplane is able to continue the flight to an aerodrome at which the requirements of paragraph 27.7 can be met, without flying below the minimum flight altitude at any point.

(b) in the case of aeroplanes having three or more engines, on any part of a route where the location of en-route alternate aerodromes and the total duration of the flight are such that the probability of a second engine becoming inoperative must be allowed for if the general level of safety implied by the Standards of this chapter is to be maintained, the aeroplane is able, in the event of any two engines becoming inoperative, to continue the flight to an en-route alternate aerodrome and land.

27.7 **Landing**.

The operator shall ensure, for each aeroplane it operates, that the aeroplane shall at the aerodrome of intended landing and at any alternate aerodrome, after clearing all obstacles in the approach path by a safe margin, be able to land, with assurance that it can come to a stop or, for a seaplane, to a satisfactorily low speed, within the landing distance available. Allowance shall be made for expected variations in the approach and landing techniques, if such allowance has not been made in the scheduling of performance data.

27.8 **Obstacle data**.

The operator shall obtain obstacle data to develop procedures to comply with paragraph 27.5. The operator shall take into account of charting compliance with paragraph 27.5.

Additional Requirements for Single-Engine Aeroplanes

27. 9 Subject to paragraph 27.10, a single-engine aeroplane shall only be operated in conditions of weather and light, and over such routes and diversions there from, that permit a safe forced landing to be executed in the event of engine failure.

27.10 An operator intending to operate single-engine turbine-powered aeroplanes at night and/or in IMC shall satisfy the Authority that the airworthiness certification of the aeroplane is appropriate and that the overall level of safety is ensured by:

(a) the reliability of the turbine engine;

(b) the operator's maintenance procedures, operating practices, flight dispatch and crew training programmes;

(c) equipment and other requirements provided in accordance with Appendix M; and

(d) automatic engine trend monitoring system.

Note: *Target level of safety (TLS) – A generic term representing the level of risk which is considered acceptable in particular circumstances.*

28 AUTHORITY TO TAXI AN AEROPLANE

28.1 The operator shall not permit an aeroplane in his charge to be taxied on the movement area of an aerodrome by a person other than a flight crew member, unless that person, seated at the controls:

(a) Has been duly authorised by the operator or its designated agent and is competent to taxi the aeroplane and to use the radio telephone;

(b) Has received instruction and continuation training in respect of aerodrome layout, routes, signs, marking, lights, air traffic control signals and instructions, phraseology and procedures, and is able to conform to the operational standards required for the safe aeroplane movements at the aerodrome; and

(c) Where applicable, has received permission from the aerodrome operator to taxi the aeroplane at the aerodrome.

29 USE OF AIRBORNE COLLISION AVOIDANCE SYSTEM (ACAS)*

29.1 The operator shall establish procedures to ensure that:

(a) When ACAS is installed and serviceable, it shall be used in flight in a mode that enables Resolution Advisories (RA) to be produced unless to do so would not be appropriate for conditions existing at the time.

(b) When undue proximity to another aircraft (RA) is detected by ACAS, the pilots, unless doing so would jeopardise the safety of the aeroplane, shall follow the RA even if there is a conflict between the RA and an air traffic control (ATC) instructions to manoeuvre.

(c) Nothing in subparagraph 29.1 (b) shall prevent the pilot-in-command from exercising his best judgement and full authority in the choice of action to resolve a traffic conflict or avert a potential collision.

*Refer to procedure in ICAO Doc 8168 PANS OPS Volume I.

(d) Unless otherwise specified in an air traffic control instruction, to avoid unnecessary airborne collision avoidance system (ACAS II) resolution advisories in aircraft at or approaching adjacent altitudes or flight levels, an aeroplane climbing or descending to an assigned altitude or flight level, especially with an autopilot engaged, shall do so at a rate less than 1 500 ft/min or 8 m/sec (depending on the instrumentation available) throughout the last 300 m (1 000 ft) of climb or descent to the assigned level when the pilot is made aware of another aircraft at or approaching an adjacent altitude or flight level

Note: Material concerning the development of these procedures is contained in the PANS-OPS (Doc 8168) Volume I, Part III, Section 3, Chapter 3

30 OPERATIONAL CONTROL

30.1 The operator is required to establish in its Operations Manual, the parties responsible for operational control, the related policies, processes, standards and procedures for the management of all flights. This would include procedures such as the preparation and dissemination of pre-flight aeronautical information contained in the AIP, AIC and AIRAC.

30.2 Additional information on Operational Control is provided in Appendix O.

30A AIRCRAFT TRACKING

30A.1 An operator shall, on or after 1 July 2016, track the position of each of his aeroplanes that has:

(a) a maximum certificated take-off mass of more than 45,500kg; and

(b) in the case of an aeroplane with a maximum certificated take-off mass of more than 27,000 kg but not more than 45,500 kg, a passenger seating capacity of more than 19 passengers.

at least once every 15 minutes while that aircraft is in flight, in the manner specified in paragraph 30A.2, except where the aeroplane's position is able to be tracked by an ATS unit that is responsible for providing air traffic service for the aeroplane at the relevant time at least once every 15 minutes.

30A.2 The aircraft tracking capability referred to in paragraph 30A.1:

(a) shall, on or after 8 November 2018, make use of automated reporting; and

(b) shall not make use of voice reporting through High Frequency (HF) radio.

30A.3 In the event that a particular aeroplane or flight cannot be tracked in accordance with paragraphs 30A.1 and 30A.2 due to temporary operational constraints, the operator may continue to operate that aeroplane or flight provided that –

(a) appropriate mitigating measures are in place for locating the aeroplane when needed;

(b) he makes a report of the non-tracking situation to the Chief Executive within 72 hours after the termination of the affected flight; and

(c) the procedures to monitor aeroplanes that could not be tracked have been incorporated into the Operations Manual.

30A.4 The operator shall establish, in his Operations Manual, procedures for the retention of aircraft tracking data to assist in determining the last known position of the aircraft as necessary.

30A.5 The operator must:

(a) establish procedures to be alerted when an aeroplane equipped in accordance with Scale GG in the Fifth Schedule of the ANO is in distress;

(b) coordinate with the ATSU when the operator, or the ATSU, has reason to believe that an aeroplane is in distress; and

(c) inform the relevant Air Traffic Services units, relevant Search and Rescue entities, and any other organisations that the Chief Executive may specify of the position of the aircraft in distress.

31 CREW BRIEFINGS

31.1 An operator is required to establish crew briefings as an integral part of SOPs.

32 DOCUMENTS TO BE CARRIED

32.1 In addition to the documents required to be carried in accordance with the Tenth Schedule of the ANO, the operator shall also ensure that the following documents are carried on all its aircraft:

(a) A certified true copy of the AOC and a copy of the corresponding operations specifications and its attachments; and

(b) In the case of aircraft operated in accordance with a leasing arrangement (as described in paragraph 10 of Chapter 1), documents specified in the Tenth Schedule of the ANO.

CHAPTER 3
AIRCRAFT LOADING

EFFECTIVE DATE : 5 OCTOBER 2012
REVISION NO : 22 (ISSUE 3)

1 GENERAL

1.1 Loading instructions should be provided to traffic staff, handling agents, cabin and flight crew, the complete detailed guidance on all aspects of the loading, weight and balance of aircraft, including in particular instructions on:

1.1.1 Controlling and promulgating the basic APS (Aircraft Prepared for Service) weights and indices;

1.1.2 Regulating the carriage and stowage of baggage and freight in passenger compartments, including particular instructions concerning the amount of hand baggage allowed and how it is to be stowed. It is essential that emergency exits, aisles and dinghy launching stations, are kept clear during take-off and landing. (Operators should also take steps to ensure that their traffic staff and agents comply with these instructions);

1.1.3 Carriage of dangerous goods;

1.1.4 Limitations on floor loading, use of weight spreading devices and positioning and securing of ballast;

1.1.5 Checking that items of freight or baggage required to be in particular compartments or holds are properly stowed. The person responsible for the trim of the aircraft must give written instructions to the person responsible for the actual loading;

1.1.6 Advising the pilot-in-command and cabin crew of essential seating restrictions;

1.1.7 The effect on RTOW of such factors as the maximum zero fuel weight, landing weight restrictions at planned destination, take-off and climb performance requirements at the departure aerodrome and enroute performance requirements;

1.1.8 Relevant C of A or flight manual limitations;

1.1.9 Fuel loading limitations;

1.1.10 Where appropriate, any special loading limitations for ferrying aircraft with one engine inoperative, C of A tests etc;

1.1.11 Where applicable the use of standard weights in accordance with the ANO, or where not specified, such weights approved by the Authority.

1.2 Freight loading instructions should include the following additional details:

1.2.1 Diagram of cabin bays and cargo holds, with dimensions, to facilitate the pre-planning of cargo distribution;

1.2.2 Particulars of the strength and usable directions of all lashing points and/or rings and details of the spacing between lashing points;

1.2.3 Information on the types and working strengths of lashings provided, and directions for stowage when not in use;

1.2.4 Instructions concerning special cases such as the loading of stretchers, carriage of livestock, etc;

1.2.5 Where appropriate, instructions on the handling, loading and securing of pallets or containers.

1.3 The practice of letting a load/trim sheet serve as loading instructions is not acceptable, and the use of a trim slide rule does not dispense with the requirement to complete a load sheet.

1.4 It is a statutory requirement that the position of the laden centre of gravity should be given on the load sheet. For this purpose, a trim sheet may be regarded as part of the load sheet even though it may be a separate document. It is essential that the complete document includes particulars of the manner in which the load is distributed, and special attention should be paid to the wording of the loading certificate. The mandatory requirement may be met by establishing that the C of G lies within the permissible limits and it may not be essential to determine its precise position unless it needs to be known in connection with aircraft handling or other factors. The load sheet should bear the reference of the APS form used and, if average weights have been used, an endorsement to that effect.

1.5 Where a ‘loading plan’ method is used, operators should show in their loading instructions the basic assumptions upon which the plan is formulated and should specify C of G limits more stringent than those permissible under the C of A. They should also confirm in the loading instructions that loading in accordance with the ‘plan’ will ensure that the laden C of G always falls within the restricted limits. If this is done, a simple statement on the load sheet that the laden C of G is between X and Y (i.e. the operator’s more stringent limits) can be accepted.

1.6 Traffic staff and handling agents (including agents at overseas aerodromes) should be provided with:

1.6.1 Loading instructions;

1.6.2 Current APS forms for all types, marks and variants of aircraft being used;

1.6.3 Details of the RTOW and fuel load for each flight.

1.7 Where traffic staff and handling agents are responsible for calculating the RTOW, operators should ensure that they have sufficient knowledge to do so and are provided with all relevant information.

2 LOAD SHEET CONTENTS

2.1 The load sheet, together with the APS form, should account for all items of the laden weight. Although they may not always be specified individually, the following are examples of items to be covered:

2.1.1 Fuel, water methanol, oil, hydraulic fluid, drinking water, toilet water, de-icing fluid;

2.1.2 Passenger seats, children’s cots, cabin floor covering and removable bulkheads;

2.1.3 Galley equipment including urns, hot cups, etc;

2.1.4 Food and beverages to be consumed in flight;

2.1.5 Bar stocks including the weight of the box or other container;

2.1.6 Navigation bag or aircraft library and navigational equipment;

2.1.7 Passengers’ hold baggage;

2.1.8 Passengers’ cabin baggage, unless this is accounted for elsewhere;

2.1.9 Flight spares and tools, spare hydraulic or de-icing fluid, etc;

2.1.10 Freight;

2.1.11 Aircraft crew baggage;

2.1.12 Dinghies, lifevests (including demonstration lifevests), flotation cots, survival packs, blankets, pillows and similar equipment;

2.1.13 Weight spreaders, lashing, ballast, etc;

2.1.14 All items of removable equipment and removable radio carried on the particular flight;

2.1.15 Food and necessary equipment when livestock is carried.

2.2 Load sheets are required to be annotated to show whether actual, standard, or approved notional weights of passengers and their baggage have been used.

3 CARRIAGE OF DANGEROUS GOODS

3.1 For the purpose of this paragraph 3 and its sub-paragraphs;

Exception means a provision which excludes a specific item of dangerous goods from the requirements normally applicable to that item.

Exemption means an authorisation granted by the Authority providing relief from the provisions of Technical Instructions.

Passenger aircraft means an aircraft that carries any person other than a crew member, employee of the operator in an official capacity, an Authorised Officer or a person accompanying a consignment or other cargo.

Incompatible means in relation to dangerous goods, if mixed, would be liable to cause a dangerous evolution of heat or gas or produce a corrosive substance.

3.2 The ANO sets out the requirements to be complied by an operator carrying dangerous goods. The carriage of dangerous goods shall be in accordance with the latest edition of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air, here-in referred to as Technical Instructions (TI).

3.3 An operator must obtain a Dangerous Goods permit issued by the Authority in order to transport dangerous goods. An operator applying for such a permit is required to give full details of its procedures, including the acceptance, handling, storage, loading of the dangerous goods, etc; before the intended date of carriage. In cases of extreme urgency, or when other forms of transport are inappropriate, or full compliance with the prescribed requirements is contrary to public interest, the Authority may grant an exemption from the provisions of the TI provided that in such cases every effort is made to achieve a level of safety equivalent to that provided by those TI.

3.4 The operator must indicate in its Operations Manual whether or not it holds a Dangerous Goods permit from the Authority.

3.5 An operator holding a Dangerous Goods permit must include in its Operations Manual procedures on the use of an acceptance checklist. The use of such a checklist is to prevent the inadvertent acceptance of dangerous goods for carriage by air unless they are accompanied by a completed dangerous goods transport document, verifying that their marking, packaging or freight container have been inspected in accordance with the procedures as contained in the TI.

3.6 An operator holding a Dangerous Goods permit must also develop procedures to enable its staff or the ground handling agent to carry out their duties, including appropriate loading, segregation of incompatible dangerous goods and inspection for damage and performing of leakage procedures. Other procedures to be developed by the operator includes the provision of written Notification To Captain (NOTOC) as specified in the TI, retention of a copy of the NOTOC on the ground and for the NOTOC to be readily accessible to the aerodrome of last departure and next scheduled arrival for each of its flights on which the dangerous goods are carried. These procedures and instructions shall apply from the time dangerous goods are accepted for carriage until they cease to be in the care of the operator or its ground handling agent.

3.7 There are general exceptions for certain types of dangerous goods which do not require a permit for carriage. These include aircraft equipment and stores, certain items carried by passengers or crew and items required for use in flight to provide veterinary aid to an animal or medical aid to a person. All operators, regardless if it holds a Dangerous Goods permit, are required to provide guidance to its crew on what items constitute dangerous goods and what items can be carried onboard the aircraft in all circumstances.

3.8 All operators are required to provide initial and recurrent training to flight and cabin crew on the transportation of dangerous goods by air as specified in the TI. This training applies even if the operator does not hold a Dangerous Goods permit, since incidents may arise from dangerous goods taken on board an aircraft unwittingly. In addition, all operators shall also ensure that all other relevant staff including staff of his handling agent involved with the carriage of passengers or cargo by air, has received initial and recurrent dangerous goods training as specified in the TI.

3.9 All operators must report to the Authority, within the timeframe indicated in Appendix Q of this AOCR, any accidents or incidents arising from the carriage of dangerous goods.

3.10 All operators approved for the public transport of passengers, including those that do not hold a Dangerous Goods permit, shall ensure that dangerous goods notices for passengers, advising on the type of dangerous goods that are prohibited to be brought onboard the aircraft, are displayed prominently at places visible to passengers (such as check-in desks, ticket sales desks and aircraft boarding areas). All operators shall ensure that information on the carriage of dangerous goods is brought to the attention of passengers during check-in. As passengers may, either in ignorance or deliberately, try to take prohibited items onto the aircraft in either their checked or carry-on baggage, the operator should train its agents and check-in staff accordingly and put in place procedures to address this issue.

Note: The list of items that passengers can carry is found in Part 8, Chapter 1 of the TI.

4 CARRIAGE OF MUNITIONS OF WAR

4.1 An operator must obtain a Munitions of War permit from the Authority in order to transport Munitions of War. An operator applying for such a permit shall submit to the Authority no later than 7 days before the relevant date of shipment an application stating the munitions of war involved, and the following information:

(b) the reason why it is essential for the munitions of war to be carried by air;

(b) a proposal (including any safety control measures specified by the applicant) on achieving a level of safety equivalent to that provided by the instructions specified in the Technical Instructions;

(c) the proposed proper shipping name, classification and UN number of the munitions of war with full supporting technical data;

(d) the proposed packaging;

(e) the quantity to be carried;

(f) any special handling required and any special emergency response information;

(g) names and addresses of the consignor and consignee; and

(h) the airports of departure and destination and the proposed dates of shipment and routing.

Note: Munitions of war are defined as weapons, ammunition, articles materials or devices as are intended, adapted or designed for use in warfare or against the person.

5 CARRIAGE OF LIVESTOCK

5.1 The carriage of livestock poses special problems particularly with regard to the determination of weights and to the control and restraint of animals such as horses, cattle, etc.

5.2 It will normally be acceptable for the weight of a consignment of livestock to be derived from the difference between the laden and unladen weight of the vehicle in which it is delivered to the aircraft, based on the evidence of an appropriate weight-bridge certificate. The average weight per animal can then be calculated for trim purposes and must be indicated on the load sheet.

5.3 If horses are to be carried, application may be made to the Authority for permission to use authorised notional weights. When notional weights are used, the load sheet must be annotated accordingly.

5.4 Loading instructions should include details of the weight dimensions, construction, method of attachment and required restraints for horse boxes or animal pens used. Guidance should be given on:

5.4.1 The checks to be carried out before loading of horse boxes or animal pens – e.g. on general condition and serviceability of fittings and lashing points;

5.4.2 Quantities of food and water to be carried based on the length of the flight and the number of animals carried;

5.4.3 Number and type of good and water containers required;

5.4.4 Method of stowage of items of loose equipment such as food and water containers and horse accoutrements;

5.4.5 Method of loading horse boxes into aircraft and of tethering the horses inside them.

5.5 Operators will be expected to comply with the standards and practices specified in the current IATA Live Animals Regulations, which give guidance on an extensive range of subjects including the labelling and marking of live-animal containers, animal health and hygiene, feeding, loading and sedation. They also give comprehensive details of many types of containers, together with a list of the animals for which they may be used.

5.6 When horses or other large or potentially dangerous animals are to be carried, operators should ensure that the sedative drugs and ammunition for the captive bolt humane killer are appropriate to the animal and that at least one groom or attendant has been trained in their use.

5.7 The minimum number of attendants to be carried in particular circumstances, should be determined by the operator, in consultation with the consignor, and specified in the operator's instructions to pilots-in-command and to the staff responsible for loading arrangements. When carrying horses, one groom for each animal carried 'line ahead' and one groom for every two horses loaded side by side will normally be acceptable.

5.8 Where attendants are carried, it is essential that they should be able to communicate readily with the pilot-in-command during the flight, and that they are briefed before the flight on procedures to be followed in case of emergency.

5.9 If horses are to be carried and the attendants wish to stand with their animals for take-off and landing, the operator will need to seek exemption from the statutory requirement for passengers and crew to be secured in their seats. Application for such exemption may be made to the Authority.

5.10 Operators should provide clear instructions to their staff on the need, after a flight carrying animals, to check the aircraft carefully for damage to the structure, fittings, wiring, etc; and for any adverse effects resulting from urination or the high level of humidity frequently produced by animals in flight.

6 RESERVED

7 AIRCRAFT LOADING

7.1 Operators are responsible for the safe despatch of their aircraft following cargo and passenger loading. In particular, the operator shall have written procedures for handling agents to ensure that any incident or damage to the aircraft during loading must be reported and assessed for airworthiness significance prior to flight.

CHAPTER 4
TRAINING AND TESTING

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1 GENERAL REQUIREMENTS FOR CREW TRAINING AND TESTING

1.1 The statutory requirements relating to crew training and periodical testing are specified in the ANO paragraph 27 and the Ninth Schedule. Training and testing are to incorporate Human Factors and Performance, and Crew Resource Management requirements. The primary purpose of this chapter is to indicate the nature of the arrangements considered necessary to ensure an adequate standard of compliance with the statutory provisions.

1.2 If the operator engages a separate training organisation to provide crew training, the operator shall ensure the training provided and flight documentations used by that training organisation shall be in accordance with the its flight safety documentation system.

1.3 Supervision of training and testing

1.3.1 A suitably qualified person should be designated to take general charge of arrangements for training and testing. His authority and responsibilities should be clearly defined.

1.4 Training staff and examiners – General

1.4.1 The operator shall ensure that sufficient examiners and instructors are appointed to conduct the periodical tests and practical training as necessary. Details of each examiner or instructor, except as provided for in paragraph 3.1.3, including his curriculum vitae shall be submitted to the Authority for approval prior to the appointment of the candidate.

1.4.2 The operator shall ensure that at least one SAFE is appointed if it has five or more AFEs, unless otherwise permitted by the DGCA.

1.4.3 Examiners and instructors should be experienced and qualified for the work, and operators will be expected to arrange, where necessary, training in teaching and examining techniques.

1.5 Training Staff and Examiners - Flight Crew

1.5.1 The following tests of pilots' competence and, where applicable, flight engineers' competence are administered by Authorised Flight Examiners:

(a) initial type rating tests - to qualify for type endorsement on a pilot's or flight engineer's licence;

(b) tests for the renewal of a type rating (Certificate of Test);

(c) tests to extend the validity and initial issue of an instrument rating.

1.5.2 The operator shall only use Authorised Flight Examiners for aircraft type rating and instrument rating tests. The Authorised Flight Examiner shall hold the appropriate ratings for the tests being conducted.

1.5.3 A pilot examiner or instructor must be qualified under the provisions of the ANO paragraph 23 to act as pilot-in-command of the aircraft, and his ability to perform the functions of a pilot-in-command while occupying the co-pilot's seat should be checked by the operator and recorded.

1.5.4 Applications for appointments as an Authorised Flight Examiner must be sponsored by the operator and submitted to the Authority.

1.6 Supervision of examiners

1.6.1 The conduct of tests by operators' examiners and of aircraft crew training will be periodically observed by Authorised Officers.

1.7 Small operators

1.7.1 The arrangements discussed in the foregoing paragraphs may not be practicable in the case of a small organisation operating one or two aircraft and employing a small number of aircraft crew. In cases such as the periodical testing of the Authorised Flight Examiner himself, special arrangements may be agreed with the Authority.

1.8 Multi-type operation

1.8.1 Pilots and flight engineers shall be limited to operating one aircraft type or, where there are significant differences between variants of a type, to one variant.

1.8.2 Notwithstanding paragraph 1.8.1, the following classes of personnel may be allowed to operate more than one aircraft type or variant :

(a) Pilots and flight engineers operating simple aircraft types;
(b) Flight instructors;
(c) Flight examiners; or
(d) Pilots operating under a Mixed Fleet Flying (MFF) operation.

1.9 Use and approval of flight simulation training devices

1.9.1 Operators must ensure that adequate ground and flight training facilities, simulators and/ cockpit procedure training devices (fixed based simulator, computer based training etc) are available for the type of training required.

1.9.2 Provision is made in the ANO for use of apparatus such as flight simulators, flight trainers and fuselage 'mock-ups' for certain periodical tests. These devices must be individually approved by the Authority and may be used only under the supervision of a person approved for the purpose.

1.10 **Records of training and tests**

1.10.1 Records must be maintained showing a trainee's progress through each stage of training. These should indicate, where applicable, the number of times each exercise in base and line training was covered, and should include information about the results of tests. Records should incorporate certificates indicating the competence of examinees to perform the duties in respect of which they have been tested.

1.10.2 Operators must keep records for all aircraft crew members showing the dates on which tests, ratings, medical certificates, licences, etc. are due for renewal. There should also be an effective system to guard against aircraft crew being rostered for duty when checks, etc. are overdue, and for verifying that licences, etc. have been renewed at the appropriate time. The periods of validity of the various tests are:

(a) type rating Certificates of Test (paragraph 1.5.1(b), and Bi-annual Base Checks (paragraphs 3.1.1(a), 3.3, 3.4, 5.1.2 and Chapter 9) are normally valid for a period of 6 months; in addition, if the same test has been passed on two occasions, separated by an interval of not less than 4 months, the rating is valid for 12 consecutive months from the first of the two tests.

(b) instrument ratings test (paragraphs 1.5.1(c), 3.6 and Chapter 9, line checks (paragraphs 3.1.1, 3.2, 4.2 and 5.1.1)) and emergency/survival checks as detailed in Chapter 6 are valid for 12 months.

Note : The base check and line check requirements for flight crew approved for MFF operations are in Appendix V.

2 TRAINING MANUAL

2.1 It is a statutory requirement in ANO paragraph 26 that a “training manual shall contain all such information and instructions as may be necessary to enable a person appointed by the operator to give or to supervise the training, experience, practice and periodical tests to perform his duties”.

2.2 Applicants for Air Operator Certificates are required to prepare a training manual and to submit a copy to the Authority, together with their application. The manual will be regarded by the Authority as a primary indication of the standards of training and testing likely to be achieved. It should give formal expression to the operator's training policy and requirements, together with adequate guidance to instructors and examiners.

2.3 Each copy of a manual should normally bear a serial number, and a list of holders should be maintained by the person responsible for issuing amendments. Where this system is not used, an operator should have satisfactory alternative arrangements for controlling the issue and amendment of manuals. Each volume of a manual should be numbered and bear a title and list of contents giving a clear indication of its scope. The title of the person or department responsible for the issue of the manual should also be indicated. At the front of each volume there should be an amendment page to indicate amendment number, date of incorporation, signature or initials of persons amending, and page(s) or paragraph(s) affected. Amended pages should be dated. The numbering of pages, sections, paragraphs, etc should be orderly and systematic so as to facilitate immediate identification of any part of the subject matter. The standard of printing, duplication, binding, section dividers, indexing of sections, etc should be sufficient to enable the document to be read without difficulty and to ensure that it remains intact and legible during normal use.

2.4 The amendment of a manual in manuscript will not be acceptable. Changes or additions, however slight they may be, should normally be incorporated by the issue of a fresh or additional page on which the amendment material is clearly indicated.

2.5 Although the training manual is a part of the operations manual it should be a separate volume addressed primarily to training staff, each of whom should normally have a personal copy. The form that the manual takes will vary considerably according to the size and complexity of the operator's organisation and the aircraft he/she uses, and its adequacy will be assessed solely on the basis of its suitability for the operator's particular needs and circumstances.

2.6 The following matters should be covered in the manual normally in the volume addressed to training staff:

2.6.1 Requirements in respect of the qualifications, training and experience of training staff;

2.6.2 A comprehensive statement of the duties and responsibilities of all training staff, which should include their names, the type of training and/or testing which they may conduct, and the types of aircraft used by the operator;

2.6.3 Minimum standards of experience and of initial and periodical training to be met by all aircraft crew for each type of aircraft used by the operator;

2.6.4 Detailed syllabi and specimen record forms for all training and testing;

2.6.5 Arrangements for administering and recording the periodical tests of all aircraft crew;

2.6.6 Methods of simulating instrument flight conditions;

2.6.7 Methods of simulating engine failure;

2.6.8 Procedures for touch-and-go or stop-and-go landings, including flap settings, minimum runway lengths, brake cooling requirements and handling techniques;

2.6.9 Limitations on training and testing in the course of flights for the purpose of public transport. Note particularly that the simulation of instrument flight conditions and of emergencies affecting the flight characteristics of the aircraft is prohibited in the course of flights for the public transport of passengers;

2.6.10 Instructions covering retesting and retraining after unsatisfactory performance or periods off flying due to illness or other causes;

2.6.11 The use of flight simulators;

2.6.12 The assessment and training of crew in the use of Crew Resource Management and Human Factors; and

2.6.13 The training of flight crew in the following areas:

(a) proper flight crew coordination and training in all types of emergency and abnormal situations or procedures caused by engine, airframe or systems malfunctions, fire or other abnormalities;

(b) avoidance of controlled flight into terrain and policy for the use of the ground proximity warning systems (GPWS);

(c) upset prevention and recovery training; and

(d) knowledge and skills related to visual and instrument flight procedures for the intended area of operation, charting, human performance including threat and error management and in the transport of dangerous goods.

3 PERIODICAL TESTS - AEROPLANE PILOTS

3.1 General requirements

3.1.1 The operators shall subject their pilots to two separate but complementary tests:

(e) Line Check : A test of competence to perform his duties in the course of normal operations, including use of the instruments and equipment provided.

(i) Maximum period of validity for this test is stated in paragraph 1.10.2(b).

(ii) The test shall be carried out in flight, unless it is for an initial line check described in sub-paragraph (iii) below.

(iii) A pilot without a valid current line check, shall undergo an initial line check which shall be carried out in a flight simulator approved for purpose of paragraph 3.1.1(b), or on an actual flight provided it is not carrying any passenger or cargo.

(f) Base Check : A test of competence to perform his duties in instrument flight conditions while executing emergency manoeuvres and procedures, including use of the instruments and equipment provided.

(i) The period of validity for this test is stated in paragraph 1.10.2(a).

(ii) The test shall conducted in a flight simulator specifically approved for this purpose, or in flight in actual or simulated instrument flight conditions provided that the flight is not carrying any passenger or cargo.

3.1.2 These tests, namely Line Check and Base Check, shall be conducted by the following authorised persons:

(a) Line Check – to be conducted by an examiner appointed by the operator in accordance with the process referred to in paragraph 3.1.3, except for the initial Line Check which shall be conducted by an Authorised Flight Examiner; and

(b) Base Check – to be conducted by an Authorised Flight Examiner.

3.1.3 For the purpose of paragraphs 3.1.1(a) and 3.1.2(a), the operator is to develop a process to appoint examiners for the conduct of Line Checks.

3.2 **Line checks - all pilots**

3.2.1 The annual line check is not intended to determine competence on any particular route. The requirement is for a test of ability to perform satisfactorily a complete line operation from start to finish, including pre-flight and post-flight procedures and use of the equipment provided. The route chosen shall be such as to give adequate representation of the scope of a pilot's operations.

3.2.2 The operator shall ensure that his pilots are competent to perform their duties. If the operator requires both the pilot-in-command and co-pilot to carry out either the pilot flying or the pilot monitoring duties, then both pilots shall be checked in both roles in accordance with the operator's procedures.

3.2.3 In addition to the above duties, a pilot-in-command shall also be assessed on his ability to manage the operation and take correct command decisions.

3.2.4 As the examiner may have to act as substitute for either pilot-in-command or co-pilot, the examiner shall be one who is fully qualified to operate at any crew station over which he/she acts in an examining capacity.

3.3 **Base checks - pilots-in-command**

3.3.1 The Bi-annual Base Check provides an opportunity for the practice of emergency drills and procedures which rarely arise in normal operations, and can generally be regarded as continuation training. The statutory requirement, however, is that pilots shall be tested, and their continued competence must be verified and certified.

3.3.2 The scope of the practice and check may be divided into three main categories, as follows:

(a) emergency manoeuvres in instrument flight conditions, including:

(i) take-off with engine failure between V_1 and V_2 or as soon as safety considerations permit. When the check is completed in an aircraft, instrument flight conditions should be simulated as soon as possible after becoming airborne;

(ii) instrument approach to decision height with one engine inoperative;

(iii) 'go around' on instruments from decision height with one or more engines inoperative;

(iv) landing with one or more engines inoperative;

(v) where appropriate to a particular aircraft type, approach and landing with flying control systems and/or flight director malfunctioning;

(vi) where the emergency drills include action by the non-handling pilot, the check should additionally cover knowledge of these drills;

(b) emergency procedures including, as appropriate:

(i) engine fire;

(ii) propeller or engine overspeed;

(iii) fuselage fire (pilot-operated system of control);

(i) engine failure before V1;

(ii) emergency operation of undercarriage and flap;

(vi) pressurisation failure;

(vii) fuel dumping;

(viii) engine relight;

(ix) hydraulic failure;

(x) electrical failure;

(xi) malfunction of engine or engine control;

(xii) in the case of aircraft with two or more flight crew, coping with incapacitation of a member of the flight crew - this check should be carried out annually, i.e. on alternate Base Checks;

(xiii) action to be taken following an ACAS or GPWS or windshear warning.

Some of these items will need to be covered by 'touch drills' and if the check is conducted in an aircraft (rather than in a simulator) they are normally best attended to on the ground.

(c) a supplementary questionnaire on technical matters and operating procedures which, although not falling within the category of emergencies, are matters on which pilots should be tested at regular intervals. Some of the items may equally well be covered in the course of a line check. Typical items to be covered include:

(i) recognition and diagnosis of aircraft system faults for which there are no set drills;

(ii) radio failure procedures;

(iii) use of operations manuals including flight guides;

(iv) familiarity with latest amendments to operations manuals, and latest issues of information circulars, and instructions to aircraft crew;

(v) loading instructions;

(vi) knowledge of internal and external check lists;

(vii) aircraft equipment such as FMS, navigation systems, flight directors, weather radar, etc.;

(viii) additional precautions for winter operations, anti-icing procedures and operations from contaminated runways;

(ix) noise abatement procedures;

(x) engine failure during stages of flight other than on take-off, especially critical stages such as during noise abatement, during a SID or flight over high ground, or during the approach.

On most of the larger modern aircraft the list of items that might usefully be discussed is likely to be extensive and examiners may prefer to deal with only a selection of items on a particular Base Check. In this event the items covered should be recorded to assist examiners in covering the full list in the course of two or three successive checks. Advantage should also be taken of the opportunity to give the pilots experience in the simulator of such rare occurrences as wind shear, flapless landing, dead stick landings etc.

3.4 **Base checks - co-pilots**

3.4.1 It is specially important that co-pilots be checked in their own particular duties in the co-pilot's seat, including flying the aircraft for take-off and landing. Although there will be some difference in emphasis from the Base Checks for pilots-in-command, the syllabus of the check should generally follow the pattern of that for pilots-in-command.

3.4.2 Pilots-in-command who may be required to handle the aircraft from the co-pilot's seat should be checked in that seat. Provided such a pilot-in-command has completed a full left hand seat Base Check, and it is still valid, the right hand seat Base Check may be abbreviated to a minimum of:

(a) an engine failure on take-off;

(b) an asymmetric “go around” from decision height; and

(c) an asymmetric landing.

3.4.3 Where the normal flight crew complement provides for three pilots, with two co-pilots, taking turns at the Systems Panel/Engineer station, the Base Check should cover duties at BOTH stations.

3.5 **Base checks – general considerations**

3.5.1 Passengers may not be carried during Base Checks. The checks are to be carried out on special training or positioning flights.

3.5.2 Stopping of engines in an aircraft in flight should be subjected to the recommendations and advice issued by the Authority from time to time.

3.5.3 Where both examiner and equipment are approved for the purpose, checks may be conducted in a flight simulator.

3.5.4 All exercises carried out should be properly recorded in the training captain's report.

3.6 Instrument ratings – all pilots

3.6.1 The instrument rating test must be completed at intervals of not more than twelve months and should normally be carried out on the aircraft type on which the examinee is employed.

4 RESERVED

5 PERIODICAL TESTS - FLIGHT ENGINEERS

5.1 The periodical tests for flight engineers should generally follow the pattern of those for pilots-in-command discussed in paragraphs 3.2 and 3.3 above omitting those items that are clearly appropriate only to pilots. The tests, which may be combined with the test requirements for licence purposes (see paragraph 1.5.1(a)), should include:

5.1.1 An annual assessment of a flight engineer's competence to perform his duties whilst executing normal manoeuvres and procedures in flight (line check), and

5.1.2 The Bi-annual assessment of a flight engineer's competence to perform his duties whilst executing emergency procedures (Base Check).

5.2 The tests as to the flight engineer's ability to carry out normal procedures must be carried out in the aircraft in flight. His ability to carry out emergency procedures may however be tested either in flight, or in a flight simulator specifically approved for this purpose.

5.3 These tests should normally be conducted by specially designated flight engineers. To the extent only that the test mentioned in paragraph 5.1.1 may take the form of an overall assessment of flight deck management and the performance of the flight crew as a whole, it may be conducted by specially designated training captains.

6 PERIODICAL TESTS - FLIGHT NAVIGATORS

6.1 Operators proposing to use flight navigators as part of the operating flight deck crew should contact the Authority for advice on the requirements, at an early stage in their planning.

7 AREAS, ROUTES AND AERODROMES COMPETENCE

7.1 Operators shall ensure that all flight crew members are familiar with the laws, regulations and procedures, and have the ability to speak and understand the language used for aeronautical radiotelephony communications pertinent to the performance of their duties, prescribed for the areas to be traversed, the aerodromes to be used and the air navigation facilities relating thereto. The operator shall ensure that all crew are familiar with such of these laws, regulations and procedures as are pertinent to the performance of their respective duties in the operation of the aircraft.

7.2 Operators shall ensure that all flight crew members meet the language proficiency requirements as specified in the Singapore Air Safety Publication (SASP) Part 1 and SASP Part 2.

7.3 It is a requirement of the ANO, Ninth Schedule part B, that an pilot-in-command shall demonstrate to the satisfaction of the operator that he/she has adequate knowledge of the route to be flown on each flight, and of the aerodromes (including alternates), terrain and minimum altitudes, seasonal meteorological conditions, ATC communications and navigational facilities and procedures associated with the route along the route(s) and applicable procedures over heavily populated areas and areas of high traffic intensity, obstructions, physical layout, lighting, approach aids and arrival, departure holding and instrument approach procedures, and applicable operating minima, search and rescue procedures, facilities and procedures to be used (see Chapter 2 paragraph 10). Certification (by the operator) of area and aerodromes competence is an annual requirement unless the pilot-in-command, after the initial certification, has flown over the area and aerodromes in the preceding twelve months.

7.4 Each pilot-in-command should be covered by a certificate of his competence in relation to each individual route and aerodrome, and operators involved mainly in scheduled services may find it convenient to adopt this procedure. The Authority may also agree to an alternative method of certification of pilots-in-command's route competence in relation to specified areas of operation or groups of routes.

7.5 If the alternative method is used, the operator must be aware that there may be a risk that a pilot-in-command, on the basis of his general experience, could be certified as competent to operate without restriction to an aerodrome which presents special problems and clearly requires route experience or special briefing however great the pilot-in-command's general experience may be. It is important, therefore, that the certificate issued by the operator should indicate positively the aerodromes to which the pilot-in-command is permitted to operate.

7.6 To avoid reproducing a long list of aerodromes in each pilot-in-command's area and airfields competence certificate, operators may find it convenient to maintain as part of the operations manual a list of "straight forward" aerodromes to which any experienced pilot-in-command could operate without restriction. For certification purposes, reference to the list would suffice. No aerodrome should be classified as unrestricted unless it is also included in the operator's flight guide and has an established instrument approach procedure.

7.7 Any aerodrome not included in the operator's unrestricted list, to which a pilot-in-command is considered competent to go, should be named in the certificate which should include a brief but clear indication of the manner in which competence has been established. To ensure consistency in certification, operators adopting the area method should also indicate in the manual the general nature of the special requirements to be met before a pilot-in-command can be considered competent at a "restricted" aerodrome. It is not practicable in this publication to specify in a manner appropriate to all circumstances the detailed requirements to be met before a pilot-in-command can be considered competent to operate to an aerodrome in a 'restricted' category. Ultimately the decision must rest on the good judgment and integrity of the operator and the measure of responsibility with which he/she approaches the problem.

7.8 The following are among the factors that operators may wish to take into account in deciding whether a pilot-in-command can be considered competent for a particular flight:

7.8.1 The imposition of special aerodrome operating minima (if operations are also confined to daylight) could in some circumstances render prior experience of the aerodrome unnecessary – and enable the pilot-in-command to get aerodrome experience in the course of normal operations.

7.8.2 There are aerodromes at which a combination of special aerodrome operating minima, prohibition of night landings and special pre-flight briefing on local conditions could be considered adequate for a first visit;

7.8.3 In general, a pilot-in-command should not be considered competent to operate to an aerodrome at which nearby mountainous terrain makes the installation of an instrument approach aid impracticable, unless after an initial visit under supervision, he/she has within the preceding twelve months flown there as pilot-in-command or co-pilot;

7.8.4 Competence to operate into a complex terminal area could sometimes, subject to acceptable general experience, be established in a flight trainer equipped for the purpose. If the complexity of ATC clearances and special characteristics of the local R/T were a factor, the use of tape recordings might be necessary.

7.8.5 In certain circumstances it may be permissible for an operator to base his decision that a pilot-in-command is competent for a particular flight on the fact that he/she will have a co- pilot with suitable general experience in addition to recent experience of the particular route and aerodrome. This procedure should be adopted only in exceptional circumstances, and the co-pilot concerned should be named in the certificate which should include details of his relevant experience;

7.8.6 A pilot-in-command whose experience is limited, say, to the Pacific and the Far East cannot be considered competent for flights in a completely different environment such as Europe or the North Atlantic.

7.9 The use of audio/visual means to familiarise pilots-in-command with aerodrome approaches may be approved.

7.10 If the operator relies in any particular instance on the verbal briefing of a pilot-in-command, it should be given by a person who is qualified to operate on the route in question: the pilot-in-command should follow this by briefing his co-pilot before the flight commences.

7.11 All certificates raised in respect of a pilot-in-command's area and airfields competence must be signed on the operator's behalf by a qualified official of appropriate status.

7.12 In a small undertaking the chief pilot or other person in charge should know in detail the experience and general competence of each of his pilots and can be expected to arrange for special route familiarisation and to raise additional certificates where necessary. For larger organisations a system of control that does not depend upon personal knowledge will be necessary in order to prevent a pilot-in-command being rostered for a flight not covered by his certificate.

8 PILOTS-IN-COMMAND AND CO-PILOTS – INSTRUMENT APPROACH PROFICIENCY

8.1 A further separate requirement to be met in respect of the pilot-in-command and co-pilot is that they must have been tested (within the periods of validity stated in paragraph 1.10.2(a)) as to their proficiency in using instrument approach systems "of the type in use at the aerodrome of intended landing and any alternate aerodrome". The tests may be carried out in flight in actual or simulated instrument flight conditions, or in a simulator or flight trainer approved for the purpose.

8.2 To comply with this requirement, operators may find it convenient to ensure that pilots-in-command are tested as to their proficiency to carry out instrument approach procedures using all the pilot interpreted aids provided in the aircraft they operate. A separate test or record to cover the requirement may not be necessary, as it may be possible to meet the regulation in the course of instrument rating tests, Bi- annual competence checks and routine line checks. (see paragraph 1.10.2.)

8.3 On many aircraft the interpretation of instruments is the same for VOR as for ILS. In these circumstances, provided there is a record of an initial test as to competence on a VOR approach and provided the pilot remains in regular practice at ILS approaches and en-route use of VOR, the separate annual VOR approach test may be dispensed with.

9 PILOT'S RECENT TYPE EXPERIENCE

9.1 Unless the operator is granted approval to carry out MFF operations, the operator shall assign a flight crew member to function as a pilot or a co-pilot on a flight, only if he/she has, in the preceding 90 days, carried out at least three take-offs and landings in an aircraft or in an approved flight simulator of the type/class to be used on that flight. In addition, the pilot-in-command should also have carried out a take-off and landing in the preceding 35 days in an aircraft or in an approved flight simulator of the same type/class.

Note : The recent type experience requirements for flight crew approved for MFF operations are in Appendix V.

9.2 To regain recent type experience, a pilot or co-pilot shall undergo a flight training programme with a Type Rating Instructor:

(a) in a non-revenue training flight; or

(b) in an approved flight simulator of the same type/class.

The flight training programme shall be approved by the Authority.

10 FLIGHT ENGINEER'S RECENT TYPE EXPERIENCE

10.1 The operator shall not assign a flight crew member to function as a flight engineer unless he/she has, in the preceding 90 days, carried out at least one sector in an aircraft of the same type or in an approved flight simulator of the aircraft type to be used.

11 FLIGHT CREW CONVERSION TRAINING

11.1 Syllabi

11.1.1 All type conversion training should be conducted in accordance with detailed syllabi included in the training manual. When considering programmes and syllabi for types of aircraft newly acquired, operators are urged to consult the Authority at the outset. The Authority will advise on the nature and scope of the training to be given, and early consultation will help to prevent difficulties and inconvenience to the operator when the syllabi is submitted for approval.

11.2 Minimum experience requirements

11.2.1 The standards for qualification and experience required of flight crew before being rostered for conversion training should be specified by the operator and agreed with the Authority.

11.3 Ground training

11.3.1 The operator should attach great importance to technical training and there should be a properly organised programme of ground instruction by competent tutors with adequate facilities, including any necessary mechanical and visual aids. If the aircraft concerned is relatively simple, private study may be adequate if the operator provides suitable manuals and/or study notes. It is important that the time allowed for ground training should be devoted exclusively to that purpose and that trainees should not be taken away from their studies or for normal flying duties. Authorised Officers will wish to examine premises and equipment to be used for ground training. They are also authorised to be present while tuition and lectures are in progress.

11.4 Examinations and tests after ground training

11.4.1 Courses of ground instruction for flight crew, should incorporate written progress tests at the end of each distinct phase.

11.4.2 For all flight crew, the ground course should cover the survival training as detailed in Chapter 6.

11.4.3 The annual "emergency/survival" test as detailed in Chapter 6 should be given before any flying training is started.

11.5 **Flying training for pilots**

11.5.1 For all pilots taking a conversion course, the flying training should be systematic and sufficiently comprehensive to familiarise them thoroughly with all aspects of normal operation of the aircraft, including the use of all flight deck equipment, and with all emergency drills, procedures, handling techniques and limitations. Pilots on conversion flying training should not be interrupted by flying other aircraft types.

11.5.2 The "flight handling" sections of the syllabus should include all the requirements of the appropriate type rating tests, and in addition the following items if appropriate to the aircraft type:

(a) aeroplanes:

(i) visual "go around" from not more than 200 ft agl;

(ii) failures of flight director system, including ILS approach without flight director;

(iii) a typical noise abatement procedure;

(b) helicopters:

(i) practice of appropriate type rating test items under instrument flight conditions including failure of flight instruments and flight directors;

(ii) recovery from unusual attitudes under instrument flight conditions.

11.5.3 Each exercise should be practised until a satisfactory standard is achieved. The various take-off, "go around" and landing exercises should be performed at least twice. Records kept by the operator should show the number of times that each exercise was covered.

11.5.4 Particular emphasis should be placed on the practice of correct crew procedures for take-off, approach, landing and "go around", and additionally, for helicopter pilots, in the procedures for IMC descent en-route in conditions of low cloud and poor visibility.

11.5.5 Pilots undergoing conversion training should at some stage be given an exercise in coping with incapacitation of another flight crew member. If the flight crew complement includes a flight engineer it will be necessary for pilots to be sufficiently familiar with his in-flight functions.

11.6 **Additional requirements for pilots-in-command**

11.6.1 Without prejudice to any of the requirements of a particular type rating test, the conversion training of pilots-in-command should include the following items insofar as they may be appropriate to the aircraft type:

(a) landing with two engines inoperative;

(b) landing without flap or slat, or with restricted flap;

(c) landing with flying control system malfunction;

(d) instrument approach and "go around" with flight director malfunction;

(e) landing at night with one engine inoperative;

(f) crosswind take-off and landing.

11.6.2 Pilots-in-command should also be given practice, normally in a simulator, in the stopping and starting of engines in flight and in any emergency drills that might fall to them while the co-pilot is handling the aircraft.

11.7 **Additional requirements for co-pilots**

11.7.1 Co-pilots (in addition to the handling practice already referred to) should be given adequate training in the execution of all emergency drills that might fall to them while the pilot-in-command is flying the aircraft. Unless this is done in a flight simulator approved for the purpose it will be necessary for co-pilots to perform all drills (e.g. engine fire and relight) in flight where the training captain is flying the aircraft. Co-pilots should also be given practice, during conversion training, in the operation of all radio equipment and aircraft systems normally managed by the co-pilot while the pilot-in-command is handling the aircraft.

11.8 **Tests after flying training**

11.8.1 Before they are assigned to line duty in a pilot's seat (whether under supervision or not) pilots-in-command and co-pilots must be certified by the operator as competent in all the functions and duties covered by the relevant Bi-annual Base Check. Training in these functions and duties MAY NOT be completed in the course of normal operations. All conversion flying training must therefore incorporate the Base Check described in paragraphs 3.3, 3.4 and 4.3 of this chapter.

11.8.2 Unless the aircraft, its handling characteristics and its flight instruments are closely similar to those of a type on which the pilot is already experienced, his conversion training should incorporate an instrument rating test on the new type. This will normally be expected to be part of a conversion programme, regardless of the expiry date of an existing instrument rating.

11.8.3 Before pilots are assigned to line duty as pilot-in-command or co-pilot, the operator shall certify, as a result of a check required by paragraph 3.2 or 4.2, that they are competent to execute normal manoeuvres and procedures under supervision. Before operating without supervision pilots-in-command and co-pilots must meet the full requirements of paragraph 3.2 or 4.2, as appropriate.

11.9 **Flight under supervision**

11.9.1 The conversion syllabus should provide for all pilots, after completion of flying training and initial tests, to operate a minimum number of sectors and/or flying hours "under supervision". The minimum figures should be agreed with the Authority.

11.9.2 The "under supervision" period should NOT be used for the completion of the basic conversion syllabus. Its purpose is two fold. Firstly, it will enable the newly converted pilot to settle down to his duties on the new type in the company of an experienced and qualified pilot specially designated for the purpose, and to turn to him for advice if necessary. Secondly, it will enable the training staff to assess and verify the adequacy of the conversion training, and to ensure that proper operating standards are achieved at the outset, in the course of normal and varied operations.

11.9.3 "Under supervision" means -

(a) **for a pilot-in-command:**

flying with an experienced pilot, qualified to act as the pilot-in-command and specially designated by the operator to act as a supervising pilot, who should occupy the seat and perform the duties of co-pilot. (Some operators may wish the newly converted pilot-in-command to operate a few sectors in the co-pilot's seat and this is acceptable if the supervising captain is in the pilot-in-command's seat);

(b) **for a co-pilot:**

flying in the co-pilot's seat with either:

(i) a qualified pilot-in-command, specially designated for the purpose, occupying the pilot-in-command's seat, or

(ii) any qualified pilot-in-command in the pilot-in-command's seat and a supervisory first officer specially designated for the purpose, occupying an additional crew seat in the flight deck.

11.9.4 On completion of the sectors under supervision a line check should be administered.

11.9.5 The "under supervision" sectors carried out by a newly qualified captain will have been completed with an experienced supervisory captain acting as co-pilot. Some operators may therefore wish to carry out a further period of flying, after the line check referred to paragraph 11.9.4, teaming the new captain with a standard crew, and with a suitably qualified pilot, specially designated for the purpose, occupying the jump seat and acting only in an advisory capacity. It should be made clear that in this situation the newly qualified captain is the pilot-in-command of the aircraft.

11.9.6 If the flight crew complement includes a pilot acting as a Systems Panel Operator he/she should, after conversion training and the initial test in these duties, operate a minimum number of sectors under the supervision of a qualified and specially designated person carried in addition to the flight crew of the aircraft.

11.10 **Use of flight simulators for conversion training**

11.10.1 The extent to which a flight simulator may be used for conversion/recurrent/recency training will be considered according to individual circumstances as approved by the Authority.

11.11 **Flight engineers**

11.11.1 Type conversion for flight engineers should follow the same general pattern as that of pilots. Newly trained flight engineers should not occupy the flight engineer's seat during take-off and landing on a public transport flight until they have completed all initial competence checks.

11.11.2 Flight engineers should operate a minimum number of sectors under the supervision of a suitably qualified and specially designated flight engineer. A line check report should be made on completion of the sectors under supervision.

11.11.3 Flight engineers undergoing conversion training should at some stage be given an exercise in coping with incapacitation of another flight crew member.

11.12 **Variants of the same aircraft type**

11.12.1 A company may operate a number of aircraft which, though of the same type, are not identical. They may differ in engines, systems, equipment, flight deck lay-out, operating procedures, performance, or in other respects. In such circumstances the operator must conduct a "differences course" for his crew to ensure they are adequately trained on each variant.

12 CONVERSION FROM FIRST OFFICER TO PILOT-IN-COMMAND

12.1 It is essential that promotion to pilot-in-command should be preceded by a planned "conversion" course, including up-grading of the type endorsement if necessary. An adequate number of sectors must be flown in the appropriate seat as pilot-in-command under supervision. There should be a full pilot-in-command's base and line check immediately before appointment.

13 SAFETY EQUIPMENT AND PROCEDURES (SEP)

13.1 The Emergency and Survival Training, Practice and Training Requirements for flight crew and cabin crew are contained in Chapter 6 of this document.

14 TRAINING ON SPECIAL EQUIPMENT

14.1 Formal training should be given to aircraft crew as necessary on items of special equipment such as storm warning radar, flight director systems, auto-pilots, Loran, Doppler, Inertial Navigation/Reference System, Global Positioning System, Communications-Navigation-Surveillance (CNS)/Air Traffic Management (ATM) systems and head-up display and/or enhanced vision system for hose aircraft so equipped.

15 FLIGHT OPERATIONS OFFICER/FLIGHT DISPATCHER AND GROUND STAFF TRAINING AND TESTING

15.1 The operator shall provide training for ground staff directly involved with flight operations (including flight operations officers/flight dispatchers), in particular those employed in operations and traffic departments. The operator shall ensure that the flight operations officer/flight dispatcher demonstrates that he/she has the knowledge; and that he/she maintains familiarisation with all features of the operation which are pertinent to such duties, including the knowledge and skills related to human performance. Further training will be necessary from time to time (e.g. when new types of aircraft are acquired) and the arrangements in this connection will be taken into account in the consideration of applications for the variation of Certificates.

15.2 The detailed requirements for flight operations officers/flight dispatchers are given in Appendix L.

15.3 The Flight Operations Officer/Flight Dispatcher training must be carried out by a qualified instructor who shall meet the following criteria:

(a) Have served at least 5 preceding years as a full time qualified flight dispatcher with an airline or at least the preceding one year as a Flight Operations Officer/Flight Dispatcher instructor in a training establishment acceptable to the Authority, and

(b) Completed successfully a Flight Operations Officer/Flight Dispatcher instructor course acceptable to the Authority.

15.4 **RESERVED**

16 DANGEROUS GOODS TRAINING

16.1 Operators are required to establish and maintain dangerous goods training programmes for those aircraft crew and ground staff concerned. Refer to Appendix J for details.

17 SECURITY TRAINING

17.1 The operator shall establish, maintain and conduct approved training programmes which enable the operator's personnel to take appropriate action to prevent acts of unlawful interference such as sabotage or unlawful seizure of aeroplanes and to minimise the consequences of such events should they occur.

17.2 The training programme shall include at least the elements identified in Appendix I. Such training programmes shall be periodically reviewed to ensure that it is kept abreast with the latest developments.

17.3 The operator shall also establish and maintain a training programme to acquaint appropriate employees with preventive measures and techniques in relation to passengers, baggage, cargo, mail, equipment, stores and supplies intended for carriage on an aeroplane so that they contribute to the prevention of acts of sabotage or other forms of unlawful interference.

18 RESERVED

19 REQUIREMENTS OF EXPERIENCE, RECENCY AND TRAINING APPLICABLE TO SINGLE PILOT OPERATION UNDER IFR OR AT NIGHT

19.1 As required under Chapter 2 paragraph 2.4, all aeroplanes operated by a single pilot under IFR or at night shall in addition to performance requirements promulgated in AOCR Appendix M, shall also satisfy the following requirements:

(a) The operator shall include in the Operations Manual a pilot's conversion and recurrent training programme which includes the additional requirements for a single pilot operation;

(b) In particular, the cockpit procedures must include:

(i) Engine management and emergency handling;

(ii) Use of normal, abnormal and emergency checklists;

(iii) ATC communication;

(iv) Departure and approach procedures;

(v) Autopilot management; and

(vi) Use of simplified in-flight documentation.

(c) The recurrent checks required by ANO Ninth Schedule shall be performed in the single-pilot role on the type or class of aeroplane in an environment representative of the operation;

(d) The pilot-in-command shall have a minimum of 50 hours flight time on the specific type or class of aeroplane under IFR of which 10 hours is as pilot-in-command;

(e) The minimum requirement recent experience for a pilot engaged in a single-pilot operation under IFR or at night shall be 5 IFR flights, including 3 instrument approaches, carried out during the preceding 90 days on the type or class of aeroplane in the single-pilot role. This requirement may be replaced by an instrument approach check on the type or class of aeroplane; and

(f) The pilot-in-command has successfully completed training programmes that include, in addition to the requirements in paragraph 18 above, passenger briefing with respect to emergency evacuations; autopilot management; and the use of simplified in-flight documentation.

20 FLIGHT CREW TRAINING AND CHECKING FOR OPERATION AT NIGHT AND/OR IMC BY SINGLE ENGINE TURBINE-POWERED AEROPLANE

20.1 The minimum flight crew experience required for night/IMC operations by single engine turbine-powered aeroplanes shall be as prescribed in paragraph 19.1(d) and 19.1(e) above.

20.2 An operator's flight crew training and checking shall be appropriate to night and/or IMC operations by single engine turbine-powered aeroplanes, covering normal, abnormal and emergency procedures and, in particular, engine failure, including descent to forced landing in night and/or in IMC conditions.

21 TRAINING REQUIREMENTS FOR ULR OPERATION

21.1 An operator shall ensure that all flight and cabin crew members of ULR flights, and rostering/planning officers responsible for rostering/planning of ULR RDAs and flights, (see Appendix C 1 for definitions) are provided with induction training and instruction on, but not limited to, the following:

(a) Pre-flight, in-flight, layover and post flight sleep and coping strategies for ULR flights;

(b) In-flight rest/sleep management, in particular regarding the requirements for at least two in-flight rest/sleep periods specified in 21.1(a) above;

(c) Alertness management and Fatigue counter measures;

(d) Physiological effects of an extensive transmeridian flights;

(e) Disturbances of circadian rhythm;

(f) Stress management.

21.2 With reference to paragraph 21.1 above, the flight and cabin crew members, and rostering/planning officers shall be provided with recurrent training in accordance with the requirements at intervals not exceeding three (3) years.

CHAPTER 5
ORGANISATION AND FACILITIES

EFFECTIVE DATE : 30 NOVEMBER 2015
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1 MANAGEMENT AND EXECUTIVE STAFF

1.1 A sound and effective management structure is essential. It is particularly important that the operational management should have proper status in the organisation and be in suitably experienced and competent hands. The duties and responsibilities of managers, senior executives and designated representatives in charge of operational control must be clearly defined in writing, and chains of responsibility firmly established. The number and nature of the appointments may vary with the size and complexity of the organisation. An excess of managers can lead to fragmentation of responsibility and control, and to as much difficulty and inefficiency as a shortage - and a lowering of operational standards can as easily result. In general, the appointment of deputies for managerial posts should be kept to a minimum and particular care should be taken in defining their functions and responsibilities. Before an AOC can be granted, the Authority must be satisfied that the management organisation of the operator is adequate and properly matched to the operating network and commitments.

1.2 The positions held by key personnel will be listed in each Air Operator Certificate, and it will be a condition of the Certificate that the Authority shall be given advance notice of any intended change in appointments or functions.

2 ADEQUACY AND SUPERVISION OF STAFF

<u>Aircraft Crew</u>

2.1.1 It will be necessary for operators to satisfy the Authority they have a sufficient number of aircraft crew for the operations to be undertaken. The adequacy of the aircraft crew will not be assessed against a set formula, as there will clearly be a wide variation in requirements according to particular circumstances, though it will be expected that even if only one aircraft is to be operated a minimum of two properly qualified aircraft crews will be employed. In certain cases where the volume of work undertaken is small the normal requirement concerning the number of aircraft crew employed may be relaxed. It is important, that all grades of aircraft crew should be employed full-time under a suitable service contract. The employment of part time or "freelance" aircraft crew will not be acceptable except in exceptional circumstances and with the approval of the Authority.

2.1.2 Flights over routes for which a flight navigator is required will not normally be permitted unless the operator has the full-time services of a sufficient number of fully qualified and licensed Flight Navigators. If the operations are on a very small scale, one navigator may be sufficient. If the introduction of advanced pilot operated navigation aids is considered to render the carriage of a licensed Flight Navigator unnecessary for a particular route then application to operate such a route without a licensed Flight Navigator may be submitted to the Authority and will be considered on its merits.

2.1.3 Suitable arrangements must be made for the supervision of all grades of aircraft crew by persons having the experience and qualities necessary to ensure the maintenance of high professional standards. This will necessitate such appointments as Chief Pilot, Flight or Fleet Manager and – in the larger organisations – Chief Navigator, Chief Flight Engineer and Chief Steward/Stewardess. The duties and responsibilities of these officials should be carefully defined, and their line flying commitments suitably restricted in order that they may have sufficient time for their managerial functions.

2.1.4 Operators must ensure that their crew shall <u>NOT</u> exercise the privileges of their licences at any time when they are aware or have been told by competent medical authority, of any decrease in their medical fitness which might render them unable to safely exercise those privileges. Such decrease in fitness shall be reported immediately to the Authority.

2.2 <u>Ground Staff</u>

2.2.1 The number of staff needed will depend primarily upon the nature and the scale of the operator's operation. The operations and traffic departments, in particular, shall be adequately staffed with trained personnel who have a complete understanding of the nature of their duties and responsibilities. Operators shall provide any further training that may be necessary from time to time (e.g. when new types of aircraft are acquired) and the arrangements in this connection will be taken into account in the consideration of applications for the variation of Certificates.

3 FACILITIES

3.1 The nature and scale of office services required – administrative staff and office equipment etc – should be related to the numbers of executive and other staff employed. It is particularly important that office services are sufficient to ensure that operational instructions and information of all kinds are produced and circulated to all concerned without delay.

3.2 In cases where the provisions of printing facilities for manuals, manual amendments and other necessary documentation is not warranted by the size of the company, the operator must show that he/she has efficient alternative arrangements.

4 ACCOMMODATION

4.1 Office space at each operating base/line station must be sufficient to provide a suitable working environment for the operating staff employed. Adequate provision must be made for the traffic staff, for operational planning, for the storage and display of essential records, and for flight planning by flight crew. If flight planning facilities for flight crew are provided by the airport authority, handling agents, the space provided by the operator can normally be reduced, but it is essential that reasonable accommodation should be made available for aircraft crew to use before and between flights.

5 OPERATIONS LIBRARY

5.1 At each operating base/line station the operator should maintain an adequate and appropriate library of maps, charts, flight guides, operations manuals and other documents needed for reference and planning purposes, and for carriage in flight. The library should be kept in an orderly fashion and responsibility for its maintenance clearly defined.

5.2 Maps, charts, and flight guides held should cover the whole of the region for which the operator is, or wishes to be, certificated.

5.3 Arrangements should be made for the amendment of manuals, flight guides etc, and for bringing the amendments to the notice of aircraft crews and other operating staff concerned. A record should be kept of the distribution of manuals and amendments.

6 AIRCRAFT LIBRARY AND NAVIGATION BAG

6.1 There shall be an effective system to ensure that aircraft are provided with an adequate and updated library of manuals, maps and charts, flight guides checklists and other necessary documents, including data in electronic form, supported by an efficient amendment service. Content lists should be provided for making up the aircraft library and navigation bag, and aircraft drill cards should include an item requiring libraries and navigation bags to be checked before departure.

7 FLIGHT STAFF INSTRUCTIONS

7.1 Flight manuals, operations manuals, and other standing instructions must be supplemented by a systematic procedure for bringing urgent or purely temporary information to the notice of aircraft crews. This should be achieved by a numbered series of flight staff instructions or crew notices issued by or under the direct authority of a senior operations official. When the issue of such a temporary instruction entails amendment of a standing instruction, the amendment should be made without undue delay and periodical checklists should be issued to show which of the temporary instructions are current. Full use should be made of these instructions to bring significant Aeronautical Information Circulars, NOTAM, changes in aerodrome operating minima, etc to the attention of aircraft crew.

8 REGULATIONS AND AERONAUTICAL INFORMATION

8.1 All flight crew, and other operating staff who may be concerned, should have access at their normal operating base to:

(a) Singapore AIP ;

(b) The ANO currently in force and any amendments thereto;

(c) NOTAM; in particular affecting facilities over the routes, destination, enroute alternates and diversion;

(d) Aeronautical Information Circulars; and

(e) Flight rules of the State of the Aerodrome is located and the requirement to comply with these rules.

8.2 Where this information is readily available to crew in an Aeronautical Information Service unit, it may not be necessary for the operator to duplicate the service, but it is nevertheless his responsibility to ensure that the information is available.

8.3 If the normal operating base/line station is abroad, the local Aeronautical Information Publication, NOTAM and appropriate manuals shall be provided. This will be agreed with the Authority.

8.4 Operators shall ensure that all employees when abroad know that they must comply with the laws, regulations and procedures of those States in which operations are conducted.

9 OCCURRENCE AND FLIGHT SAFETY REPORTS

9.1 Responsibility for co-ordinating action on occurrence reports, mandatory or otherwise, and for initiating any necessary investigations should be assigned to a suitably qualified senior officer with clearly defined authority and status. Reports should be made to the Authority or local civil aviation authority through this officer, in accordance with the timelines set out in Appendix Q.

9.2 Particular care should be taken to ensure that the originators of flight safety reports are informed of the action taken, and where it would be useful in the interest of safety the circumstances of the incident should be made generally known within the operator's organisation.

10 SAFETY MANAGEMENT SYSTEM

10.1 The operator shall implement a safety management system acceptable to the Authority that:

(a) Identifies safety hazards and assesses, controls and mitigates risks;

(b) Ensures the implementation of remedial actions necessary to maintain the agreed safety performance;

(c) Provides for continuous monitoring and regular assessment of the safety performance achieved; and

(d) Aims to make continuous improvement to the overall safety performance of the safety management system.

10.2 The framework for the implementation and maintenance of a safety management system must include, as a minimum, the elements as listed on Appendix P.

10.3 A safety management system shall clearly define lines of safety accountability throughout the organisation, including a direct accountability for safety on the part of senior management.

10.4 Flight Data Analysis Program

The operator shall establish and maintain a flight data analysis program as part of its safety management system. The flight data analysis program shall be non-punitive and contain adequate safeguards to protect the source(s) of the data

10.5 Flight Safety Documents System

10.5.1 The operator shall establish a flight safety documents system, for the use and guidance of operational personnel, as part of its safety management system.

10.5.2 The development of a flight safety documents system is a complete process, and changes to each document compromising the system may affect the entire system. The operational documents are to be consistent with each other, and consistent with regulations, manufacturer requirements, and Human Factors principles. It is also necessary to ensure consistency across departments as well as consistency in application. Hence, the emphasis on an integrated approach, based on the notion of the operational documents as a complete system.

10.5.3 The guideline is provided in Appendix K1 and it addresses the major aspects of the operator's flight safety documents system development process. The guidelines are based not only upon scientific research, but also upon current best industry practices, with an emphasis on a high degree of operational relevance.

10.6 Training on Human Factors and Crew Resource Management

10.6.1 The operator shall establish and implement a human factors and crew resource management training program for all operating staff. These training programs shall be regularly reviewed and updated, as appropriate, to keep abreast of industry standards. Operating staff is defined in paragraph 25(4) of the ANO as the employees and agents employed by the operator, whether or not as members of the crew of the aircraft, to ensure that the flights of the aircraft are conducted in a safe manner.

10.6.2 The training shall include, but should not be limited to, the following topics:

(a) Communications.

(b) Situational awareness.

(c) Problem-solving / decision-making / judgement.

(d) Leadership / following.

(e) Stress management.

(f) Critique.

(g) Interpersonal skills.

10.7 Rescue and Fire Fighting Service

10.7.1 The operator of an aeroplane shall, as part of its safety management system, assess the level of rescue and fire fighting service (RFFS) protection available at aerodrome(s) specified in the operational flight plan to ensure that an acceptable level of protection is available for the aeroplane intended to be used.

10.7.2 Information related to the level of RFFS protection that is deemed acceptable by the operator shall be contained in the operations manual.

10.8 Flight operations with known or forecasted volcanic ash contamination

10.8.1 For operation into airspace or aerodrome that is forecast or known to be contaminated with volcanic ash, the operator shall have, for the guidance of its flight dispatch and operational control and in-flight management, documented procedures and safety risk assessment processes within its safety management system accepted by the Authority.

Note 1. - Guidance on the risk management of flight operations in known or forecast volcanic ash contamination is provided in ICAO Doc 9974 – Flight Safety and Volcanic Ash.

Note 2. - Procedures recommended for use by pilots whose aircraft have inadvertently encountered a volcanic ash cloud and for post-flight reporting can be found in ICAO Doc 9691 – Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds.

11 OPERATIONAL FLIGHT PLANS

11.1 The operator shall complete and file to the appropriate ATS unit an ATS flight plan for each intended flight. Such ATS flight plan shall be approved and signed by the pilot-in-command, and, where applicable, the flight operations officer/flight dispatcher. A copy shall be kept by the operator or designated agent.

11.2 The operator shall complete an operational flight plan for each intended flight, and supply for the use of the flight crew operational flight plan forms or prepared flight plan/logs to be used on all flights. The operational flight plan is the operator's plan for the safe conduct of the flight based on considerations of aircraft performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes (or heliports, as appropriate) concerned. The operational flight plan shall be approved and signed by the pilot-in-command, and where applicable, the flight operations officer/flight dispatcher. A copy of the operational flight plan shall be filed with the operator or a designated agent, or left on record in a suitable place at the point of departure. The following entries should be provided for:-

(a) Name of flight deck crew;

(b) Flight number (or other designation), date, aircraft type and registration;

(c) Names of reporting and turning points together with codings and frequencies of radio aids;

(d) Tracks and distances;

(e) Flight times between reporting and turning points;

(d) ETA, revised ETA and ATA at each reporting and turning point;

(f) Minimum safe altitude for each stage of the flight;

(g) Altimeter settings at points of departure and destination;

(h) Cleared cruising altitudes or flight levels;

(i) Destination alternate aerodrome and en-route alternate aerodromes for extended range operations by aeroplanes with two engines (EDTO);

(j) EDTO; RVSM; MNPS; RNP; RNAV

(k) Information from meteorological broadcasts;

(l) A brief and simple statement of the fuel requirement and the manner in which it was computed (e.g. three figures – fuel to destination, fuel for diversion and holding, fuel for contingencies and total fuel – would suffice);

(m) If not maintained separately, a fuel log in which to record in-flight fuel checks;

(n) Space for noting ATC clearances;

(o) Taxi, airborne, landing and engine-off times.

11.3 Operators should ensure that the forms are properly completed for each flight and retained for a period of at least three months.

11.4 For scheduled journeys it is desirable that operators should use a prepared navigational flight plan on which tracks, distances, minimum safe altitudes, etc are printed. Special precautions will be necessary, of course, to ensure that amendments are incorporated as they become effective.

11.5 <u>Voyage Reports/Records</u>

11.5.1 The Operator shall maintain a Report/Record for all flights undertaken. The Voyage Report/Record shall be completed by the Pilot-in-command of the flight and retained by the operator for a period of at least 6 months. The Voyage Report/Record shall include the following information:

(a) Names of all crew, their duty assignments and in-flight rest times (as applicable);

(b) Details of the flight undertaken, such as date, flight number; and

(c) Significant times of the flight such as pushback, taxi, takeoff, landing and chocks on.

Note: All times shall be in UTC.

11.5.2 The Voyage Report/Record shall be signed by the Pilot-in-command of the flight who shall be responsible for the accuracy of the data entered thereon. All entries shall be made in indelible ink or indelible pencil.

11.6 Records of Emergency and Survival Equipment Carried

11.6.1 The operator shall have available for immediate communication to rescue co-ordination centres lists containing information on the emergency and equipment carried on board any of their aircraft engaged in international air navigation. The information shall include, as applicable, the number, colour and type of life rafts and pyrotechnics, details of emergency medical supplies, water supplies and the type and frequencies of the emergency portable radio equipment.

12 PILOT-IN-COMMAND'S FLIGHT BRIEF

12.1 For flights on routes not normally flown, pilots-in-command must be provided with a suitable brief, a copy of which should be retained by the operator for at least three months. The brief should include guidance on the schedule to be maintained and on all operational aspects of the voyage not fully covered in the operations manual - including in particular details of the routes to be flown, specific aerodrome operating minima for all aerodromes (including alternates) likely to be used, and details of the navigation and terrain clearance procedures to be used.

CHAPTER 6

EMERGENCY AND SURVIVAL TRAINING, PRACTICE AND TESTING REQUIREMENTS FOR FLIGHT CREW AND CABIN CREW

EFFECTIVE DATE : 5 OCTOBER 2012
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1 GENERAL REQUIREMENTS

1.1 Statutory Requirements

1.1.1 Statutory requirements relating to the training and periodical testing of crews are prescribed in the ANO. The primary purpose of this chapter is to indicate the arrangements considered necessary to secure an adequate standard of compliance with the statutory provisions.

1.1.2 Further details and references on training requirements and standards can be found in ICAO Document 7192-AN/857, Training Manual Part E-1 Cabin Attendants' Safety Training.

1.1.3 Additional training requirements for Ultra Long Range (ULR) operations, are specified in Chapter 4.

1.2 Crew Co-ordination and Combined Training

1.2.1 The successful containment of aircraft emergencies depends heavily upon effective co-ordination and two-way communication between flight crew and cabin crew member.

1.2.2 Operators are expected to make every effort to provide combined training for flight crew and cabin crew. Much of the training that both must receive prior to operating public transport aircraft covers common ground; paragraphs 3 (Initial Training), 5 (Aircraft Type Training) and 7 (Recurrent Training) of this Chapter specify training that all crew members must be given.

1.2.3 Additional training that cabin crew must receive is listed in paragraphs 4, 6 and 8. Flight crew should be made aware of such additional training provided to cabin crew in compliance with this requirement.

1.2.4 Particular emphasis should be placed on the provision of joint practice in aircraft evacuations so that all who are involved learn of the duties other crew members must perform before, during and after the evacuation. The importance of effective co-ordination and two-way communication between flight and cabin crew in various abnormal and emergency situations should also be stressed. Emphasis should also be placed on co-ordination and communication within the crew in normal operational situations including the use of correct terminology, common language and effective use of communications equipment.

1.2.5 Cabin crew should also be trained to identify unusual situations that might occur inside the passenger compartment, as well as any activity outside the aircraft that could affect the safety of aircraft and/or passengers and effectively communicate such information to the flight crew.

1.2.6 When combined training cannot be arranged, an operator's instructors should adopt the role of flight crew or cabin crew, as appropriate.

1.2.7 To facilitate training and to promote consistency of drills and procedures, it is essential that there is effective liaison between flight crew and cabin crew training departments.

1.3 **Training Syllabus**

1.3.1 A detailed emergency and survival training and testing syllabus is to be specified in the training manual. The syllabus should differentiate between initial training, aircraft type training, recurrent training, the annual emergency survival test and the 24-month periodic practice.

1.4 **Training Staff and Examiners**

1.4.1 A suitably qualified person should be appointed to manage cabin safety training and testing. Such appointment should be subject to acceptance by the Authority.

1.4.2 An applicant applying for appointment as a training instructor should have a minimum one year experience as a crew member or previous experience as a safety training instructor. The experience should be acquired within the last 5 years from the date of application.

1.4.3 An applicant without the experience requirement in as stipulated in 1.4.2 but with other relevant aviation experience or appropriate qualifications may be still be considered for appointment subject to the Authority's approval.

1.4.4 All applications for appointment should be submitted by the operator to the Authority for approval. The application should include the qualifications, experience requirements, and the proposed training programme as specified in the Operator's Training Manual (Part D).

1.4.5 The training personnel conducting the instructor training must have current knowledge, ability and recent experience as an instructor and examiner. The appointment of these training personnel shall be subjected to the approval of the Authority.

1.4.6 For newly appointed Instructor/ Examiner with less than 2 years of experience, he/ she is required to:

(a) be checked by a CAAS authorised officer or an operator's examiner authorised by CAAS, every 12 months on their competency as instructor and/or examiner.

(b) carry out a minimum of 2 observation flight sectors on the operator's flight within the last 12 months.

1.4.7 The re-appointment as Instructor and/or Examiner with more than 2 years of experience will be as follows:

(a) be checked by a CAAS authorised officer or an operator’s examiner authorised by CAAS, once every 24 months on their competency as instructor and/or examiner; and

(b) carry out a minimum of 2 observation flight sectors on the operator's flight within the last 24 months.

1.4.8 An operator is required to maintain the following records of their instructors and examiners:

(a) training records
(b) training classes conducted
(c) examinations conducted
(d) observation flights
(e) checks as carried out by CAAS authorised officers or the examiner authorised by CAAS.

1.5 **Supervision of Instructors and Examiners**

1.5.1 The conduct of crew training and of tests carried out by the operator’s instructors may be observed by Authorised Officers.

1.6 **Records of Emergency and Survival Training and Tests**

1.6.1 Records must be maintained to show trainees' attendance at each type of training and include information about the results of tests. Records should incorporate certificates indicating the competence of trainees to perform the duties on which they have been tested. Advice on the form of records and certificates may be obtained from the Authority.

1.6.2 Operators must keep records for all crew members to show when the next practices and tests are due for renewal. There should also be an effective system to guard against crews being rostered for duty when practices and tests are overdue. The annual emergency and survival test is valid for twelve months.

1.6.3 Records of all initial training aircraft type training, recurrent training, periodic practice and testing of all crew must be made available when requested by the Authority.

1.6.4 To facilitate inspection by the Authorised Officers, all crews must carry their certificate of proficiency issued by the operator whenever they are operating a flight.

1.7 **Use and Approval of Aircraft Emergency Training Apparatus**

1.7.1 Provision is made in the ANO for use of “mock ups” for certain periodical tests. These devices must be individually approved by the Authority for test purposes and may be used for such purpose only under the supervision of a person approved for that purpose. Approvals normally restrict the use of such devices to the particular operator's crews.

1.7.2 Details regarding the approval of training apparatus and the approval of personnel responsible for conducting the training and testing on such apparatus are contained at paragraph 10 of this Chapter.

1.8 Lease of Singapore Registered Aircraft Operated By Foreign Cabin Crew

1.8.1 Subject to the Authority’s approval, consideration may be given to foreign cabin crew to undergo a special training programme in lieu of the requirements as spelt out in paragraphs 3, 4, 5, 6, 7 and 8 of this chapter. All necessary training records and information pertaining to the foreign operator’s cabin crew shall be provided to the Authority at least 7 working days in advance for assessment.

1.8.2 Any special training programme approved by the Authority shall be at least 2 days in duration. Such training programme shall include all testing requirement as spelt out in this chapter in order to enable the foreign cabin crew to operate charter flights for a short period under a Singapore Operator Certificate.

1.8.3 Authorised Officers will conduct an inspection of such special training programme including the first flight being carried out by the operator using the foreign cabin crew. The operator shall bear all expenses incurred in carrying out such inspections.

2 PURPOSE AND PROVISION OF TRAINING

2.1 Applicability

2.1.1 The requirements of this Chapter are applicable to all operating flight crew and cabin crew carried on board an aircraft.

2.2 Purpose

2.2.1 The purpose of emergency and survival training, practice and testing is to provide crew with the knowledge, skills and confidence needed to ensure that they deal efficiently with different types of emergency and survival situations.

2.3 Arrangements

2.3.1 Operators are to ensure that organised courses of instruction are given by qualified instructors on the use of all emergency and survival equipment, and on all emergency procedure and drills, including aircraft emergency evacuation.

2.4 Training Aids

2.4.1 Suitable training aids should be provided to enhance the presentations in both classroom and practical instruction sessions.

2.5 **Number of Trainees per Instructor**

2.5.1 In order to provide for sufficient supervision and control during training, the maximum number of trainees per class shall not exceed 25. A class of 20 trainees or less may be conducted with one instructor; however, two instructors shall be provided if the class size exceeds 20 trainees. The operator shall ensure that suitable classroom training facilities are provided.

2.6 **Before Flying on Aircraft**

2.6.1 Before flying training is commenced on actual aircraft, all crew are to have successfully completed all necessary training, practice and tests as described in this Chapter.

2.7 **Introduction of New Equipment**

2.7.1 The operator is to ensure that the appropriate crews are trained on the use of new equipment that is introduced.

3 INITIAL TRAINING - ALL CREW

3.1 **Introduction**

3.1.1 Crew are to be trained in the following subjects which are of a general nature and not necessarily related to a specific aircraft type.

3.2 **Crew Co-ordination**

3.2.1 Emphasis is to be placed on the importance of effective co-ordination and two-way communication between flight crew and cabin crew in various emergency situations. Cabin crew should be trained to be alert, and to identify unusual situations that might occur inside the passenger compartments, as well as any activity outside the aircraft that could affect the safety of the aircraft or its occupants. The need for effective communications or accurate information between flight crew and cabin crew must be stressed.

3.3 **Aeromedical and First Aid Topics**

3.3.1 Instruction should be given on aeromedical topics such as:

(a) first aid subjects appropriate to the aircraft type, i.e. its size and the number of flight crew carried;

(b) guidance on the avoidance of food poisoning, with emphasis on the choice of a pre-flight meal and the importance of the pilot-in-command and co-pilot eating different food at different times during the flight, especially on long sectors;

(c) the possible dangers associated with the contamination of the skin or eyes by aviation fuel and other fluids and their immediate treatment;

(d) the recognition and treatment of hypoxia and hyperventilation; and

(e) first aid associated with survival training appropriate to the route operated (e.g. polar, desert and jungle).

3.3.2 Flight crew who operate on aircraft where cabin crew are not carried should undertake training in basic first aid that is to include the use and contents of first aid kits and in cardiopulmonary resuscitation.

3.4 Fire and Smoke Training

3.4.1 Practical fire and smoke training must be conducted under the supervision of an instructor who has the knowledge, ability and experience to conduct such training.

3.4.2 Both theoretical and practical training should be given. The training is to:

(a) an appreciation of the chemistry of fire as a preliminary to consideration of the choice of extinguishing agents for particular fire situations, the techniques of applying extinguishing agents, and if practical, the consequences of misapplication and their use in a confined space; and

(b) a demonstration or film on fire extinguishers being used on various types of fires. Fires should be related to typical aircraft interior equipment and include galley fires, fires in toilets, upholstery, passenger service units and electrical installations.

3.5 Water Survival Training

3.5.1 Where flotation equipment is carried, a comprehensive wet drill to cover all ditching procedures must be practised by all crews. This wet drill is to include, as appropriate, practice of the actual donning and inflation of a life-jacket, together with a demonstration or film of the inflation of life-rafts and/or slide-rafts. All crews must board a life raft or similar flotation equipment from the water whilst wearing their uniform or similar attire with a life-jacket identical to that being carried on the aircraft. Training must include the use of all survival equipment carried on board the life raft or flotation equipment and any additional survival equipment carried separately on board the aircraft.

3.5.2 Operators conducting intensive offshore helicopter operations will need to carry out the wet drills annually. Consideration should be given to the provision of further training such as underwater escape training.

3.6 Survival Training

3.6.1 Operators are to provide survival training, including the use of any survival equipment carried, appropriate to their areas of operation, e.g. polar, desert, jungle or sea.

3.7 Human Factors

3.7.1 Training should address the physiological effects on the human body of flying, the problems associated with pressure change and hypoxia and the need for restrictions on underwater diving. Training should include information on flight time limitations, the effects of operating for extended periods of time and the effects of time zone changes. Operational limitations should include illness, use of alcohol and drugs, blood donations etc. Advice should be given on general health care, especially whilst operating overseas, and the need for preventive medicine such as immunisation, when operating to potentially infected areas.

3.8 **Aerodrome Emergency Services**

3.8.1 The operational procedures of ground-based emergency services at aerodromes should be discussed.

3.9 **Aviation Security**

3.9.1 Training is to be given in aspects of aviation security listed in Appendix I of this document.

3.10 **Dangerous Goods Training**

3.10.1 Operators are required to provide Dangerous Goods training. See Appendix J for details.

3.10.2 Operators must ensure that all its crew members have passed a written test on Dangerous Goods prior to operating as a crew member. For validity reasons, this test has to be re-taken before the end of the second year of his currency. For cabin crew this test shall be retaken annually.

3.11 **Cabin Crew Service Duties**

3.11.1 Cabin crew should also receive training in their normal flying duties including the location and use of all cabin and galley equipment and to take the necessary safety precautions to prevent injuries when using such equipment.

4 INITIAL TRAINING - ADDITIONAL ITEMS FOR CABIN CREW

4.1 **General**

4.1.1 Cabin crew are to be trained in the following additional subjects which are of a general nature and not necessarily related to a specific aircraft type.

4.2 **Discipline and Responsibilities**

4.2.1 Operators must ensure that cabin crew receive training on:

(a) the importance of performing their duties in accordance with the operations manual;

(b) continuing competence and fitness to operate as a cabin crew member with special regard to fatigue;

(c) an awareness of the aviation regulations relating to cabin crew and the role of the Authority;

(d) general knowledge of relevant aviation terminology, phases of flight and parts of the aircraft;

(e) pre-flight briefing of cabin crew and the provision of necessary safety information with regard to their specific duties;

(f) the importance of ensuring that relevant documents and manuals are kept up to date with amendments provided by the operator;

(g) the importance of identifying when cabin crew members have the authority and responsibility to initiate an evacuation and other emergency procedures; and

(h) the importance of safety duties and responsibilities, and the need to respond promptly and effectively to emergency situations.

4.3 First Aid

4.3.1 Instruction should be given on first aid and the use of first aid kits, together with the application of any drugs. The following subjects should be covered:

(a) haemorrhage;

(b) wounds;

(c) fractures, including dislocation and sprains;

(d) burns;

(e) care of the unconscious;

(f) shock;

(g) heart attacks;

(h) stroke, epilepsy, diabetes;

(i) rescue breathing and cardiopulmonary resuscitation for infants and adults;

(j) use of therapeutic oxygen and oxygen sets;

(k) poisoning;

(l) emergency childbirth;

(m) choking;

(n) stress reactions and allergic reactions;

(o) air sickness; and

(p) asthma.

Note: Crew must demonstrate their proficiency in rescue breathing and cardiopulmonary resuscitation using a dummy specifically designed for the purpose.

4.4 **Fire and Smoke Training**

4.4.1 It is particularly important that cabin crew should be given theoretical and practical training in dealing with emergency situations involving fire and smoke in the cabin. The training is to include:

(a) the responsibility of cabin crew to deal promptly with emergencies involving fire and smoke. Emphasis should be placed on the importance of identifying the actual source of the fire;

(b) the importance of informing the flight crew immediately that fire or smoke is discovered and of keeping them informed as the situation develops. The importance of crew co-ordination and communication is to be emphasised, together with an established procedure for communication with the flight deck; and

(c) the importance of ensuring that passengers are aware of no smoking areas and obey no smoking signs. Emphasis is to be placed on the frequent and systematic checking of toilets (including smoke detectors, if applicable) and other areas which are not part of the seating accommodation;

4.5 **Abusive Passengers**

4.5.1 Operators are to give advice to cabin crew on the management of passengers who become abusive; this often arises from excessive consumption of alcohol or the effects of medication/drugs, or a combination of both.

4.6 **Seat Allocation**

4.6.1 Cabin crew are to be given training on the importance of correct seat allocation with particular emphasis on the seating of disabled passengers and the necessity of seating able-bodied passengers adjacent to unsupervised exits.

4.7 **Prohibited and Dangerous Items**

4.7.1 Cabin crew should be given training in aspects of the carriage of prohibited and dangerous goods and the handling of in-flight dangerous goods incident.

4.8 **Flight Time Limitations**

4.8.1 Cabin crew must be made familiar with the company flight time limitations scheme and the statutory requirements regarding crew fatigue (see appendix C2).

4.9 **Crew Resource Management (CRM) Training**

4.9.1 Operators must provide CRM training for all cabin crew. The training should focus on the functioning of crew members as a team and not simply as a collection of competent individuals. They should be shown the importance of effective teamwork and communication, the barriers involved and how to overcome them. Emphasis should be given on their role as safety practitioners and the need to maintain a high level of awareness in the environment they operate in.

4.10 **Aircraft Safety On The Ramp**

4.10.1 Training should be given in the following areas:

(a) Selection and implementation of appropriate rapid disembarkation or evacuation measures.

(b) The need for an external means of disembarkation to be available from the time an aircraft comes on a stand until it departs, excluding periods when there are no persons on board.

(c) The need to ascertain the availability of an aerobridge or steps before deciding what would be the best method to use.

(d) Specific procedures for alerting of emergency services when an incident occur during routine embarkation/disembarkation of passengers and when passengers are on board and the aircraft is parked.

(e) Emergency procedures for the rapid disembarkation of occupants of an out of service aircraft should the need arise.

4.11 **Passenger Briefings**

4.11.1 Training and practice is to be given in the pre-flight briefing of passengers in normal and emergency situations, including landings, ditching, demonstrating the brace position and the briefing of able-bodied passengers on how to operate the emergency exits.

4.11.2 Briefings are to be given in English, and in any other language where passenger demography so require.

4.11.3 Training should also be given for the conduct of pre-flight safety briefings to handicapped passengers.

4.12 **Cabin Baggage and Cabin Clutter**

4.12.1 Cabin crew are to be instructed that cabin baggage, service items and other objects are only to be stowed in approved areas such that they are restraint against forward, lateral and vertical movement. They must not be stowed in such a way as to obstruct or damage emergency equipment or exits. Training is to include the areas of the cabin that are approved for the stowage of cabin baggage or other items and the areas where it would be unsafe to do so.

4.13 **Brace Positions**

4.13.1 Training and practice is to be given in the correct brace positions for both crew and passengers. Such training must take into account different seating configurations and orientation.

4.14 **Evacuation Procedure and Emergency Situations**

4.14.1 Emergency evacuation is to include the recognition of particular types of emergency situations. Cabin crew will also need to recognise when exits are unusable or when evacuation equipment is unserviceable and to act accordingly to overcome these problems. Circumstances might arise, such as the incapacitation of the flight crew, where these drills need to be initiated by cabin crew.

4.14.2 Cabin crew are also to be trained to deal with the following specific emergency situations:

(a) an unpremeditated emergency on take-off or landing and ditching;

(b) an in-flight fire, with particular emphasis on establishing the fire source;

(c) sudden decompression, including the donning of portable oxygen equipment; and

(d) severe turbulence.

4.15 **Crowd Control**

4.15.1 Operators are to provide comprehensive training in the practical application of all aspects of crowd control technique in various emergency evacuation situations. Training is also to emphasise the need for cabin crew to be assertive and, at times, aggressive during an emergency evacuation. Scenarios must be as realistic as possible and should include, as a minimum:

(a) communications between flight crew and cabin crew and use of all communications equipment, including the difficulties of co-ordination in a smoke-filled environment;

(b) verbal commands;

(c) the physical contact that may be needed to direct passengers out of an exit and on to a slide;

(d) the re-direction of passengers away from unusable exits;

(e) the marshalling of passengers away from the aircraft;

(f) the evacuation of disabled passengers; and

(g) authority and leadership.

4.15.2 The executive order to initiate an emergency evacuation is to be given by the pilot-in-command in English (e.g. "Evacuate, Evacuate"). Cabin crew of a particular nationality if carried on board where passenger demography so requires should be able to repeat the evacuation order and commands in their native language if the need arises (e.g. Japanese, Korean, Bahasa Indonesia).

4.16 **Pilot Incapacitation**

4.16.1 Where the flight crew consists of only 2 pilots, cabin crew are to be given training in recognising the signs of subtle incapacitation and practise the ways in which they can be of help in the event of pilot incapacitation. The cabin crew should also be taught on the principle of pilot incapacitation drills which will include the following:

(a) the need to use the pilot's oxygen equipment;

(b) fastening and unfastening pilot's seat harness and, in the case of inertia and harness, locking and unlocking the inertia device; and

(c) using pilot's sliding seat mechanism; and "locking" the pilot in his seat rather than on removing him from the seat, which may not in the event be possible.

5 AIRCRAFT TYPE TRAINING – ALL CREW

5.1 **General**

5.1.1 Operators should ensure that comprehensive training is given on the operating procedures and the location and use of all emergency and survival equipment to be carried on the aircraft, and that all emergency training is related to the aircraft type, series and configuration to be operated. Aircraft type training must be given to all newly employed crew and to those who are converting to a new aircraft type.

Note: The actual use of safety equipment and training of operating procedures need not be repeated for crew who are still currently flying with the operator and have covered the same type of safety equipment and procedures in previous training provided by the operator.

5.2 **Emergency and Survival Equipment**

5.2.1 Training must be given in the location and use of all emergency and survival equipment together with the relevant drills and procedures. The following must be included:

(a) emergency exits including its normal operation;

(b) escape slides and, where non-self supporting slides are carried, the use of any associated ropes;

(c) life-rafts and slide-rafts, including the equipment attached to and/or carried in the raft;

(d) life-jackets, infant life-jackets and flotation cots;

(e) drop-out oxygen and its manual deployment;

(f) emergency and therapeutic oxygen;

(g) protective breathing equipment and protective clothing;

(h) fire extinguishers;

(i) fire axes;

(j) portable lights including torches;

(k) emergency lighting systems, including floor proximity lighting systems;

(l) communications equipment, including megaphones;

(m) survival packs, including their contents;

(n) pyrotechnics;

(o) first aid kits and their contents;

(p) toilet compartment smoke detector systems;

(q) evacuation alarm systems; and

(r) non-mandatory or special equipment fitted or carried.

Note: A visit to an actual aircraft to familiarise the crew on the aircraft features and the location and complement of all safety equipment is mandatory prior to commencement of line flying.

5.3 Fire Training

5.3.1 Training must be given in extinguishing a fire, representative of an interior aircraft fire using the relevant type of fire extinguisher carried on the aircraft. Emphasis is to be placed on the characteristics of different types of extinguishers, including their effective range and duration and the effectiveness of their use on differing types of fires.

5.4 Protective Breathing Equipment and Protective Clothing

5.4.1 Crews must be trained in the use of protective breathing equipment and if applicable protective clothing. Donning and wearing of such equipment and clothing should be practised in an enclosed, simulated smoke-filled environment.

6 AIRCRAFT TYPE TRAINING - ADDITIONAL ITEMS FOR CABIN CREW

6.1 Practical Training

6.1.1 The following are the minimum level of training necessary to satisfy the relevant requirements for cabin crew aircraft type training:

(a) during ditching and evacuation drills, each trainee operates and actually opens all normal and emergency exits; attaches escape slide fittings in their proper places; descends an escape slide from a height representative of the aircraft main deck sill height (not required for subsequent type training unless sill height is significantly higher); locates and operates the megaphone; and removes life-rafts from stowages and positions in the launching area. Additionally, the trainee must demonstrate the ability to locate and remove from stowage the aircraft first aid kits and fire extinguishers;

(b) each trainee observes a demonstration of an escape rope being used as a means of emergency evacuation; the inflation or release, as applicable, of an escape slide; inflation of a life-raft; the survival equipment contained in the life-raft; the contents of the first aid kits; administering supplemental crew and passenger oxygen by portable equipment;

(c) each trainee observes a demonstrations of the use of each type of fire extinguishers carried on the aircraft on various types of fire including simulated electrical, cabin furnishing and galley fires. The demonstration should also show the effect of misapplication of agents;

(d) each trainee handles and uses each type of fire extinguisher carried on the aircraft;

(e) each trainee practices the donning of oxygen masks carried in the aircraft; and

(f) each trainee is familiarised with the use of the aircraft public address (PA) and interphone system.

6.2 **Pilot Incapacitation**

6.2.1 When the aircraft type consists of a minimum crew of only 2 pilots, cabin crew must be given training on the following, specific to the aircraft type:

(a) use of pilot's oxygen equipment;

(b) fastening and unfastening pilot's seat harness and in the case of inertia reel harness, locking and unlocking the inertia device; and

(c) using the pilot's sliding seat mechanism. Training is to be given with the seat occupant simulated physically collapsed. Emphasis to be placed on 'locking' the pilot in his seat rather than removing on him from the seat, which may not in the event be possible.

6.3 **Passenger Briefing on Self Help Exits**

6.3.1 Training and practice are to be given to cabin crew on briefing the passengers on the operations of self help exists, applicable to the aircraft type.

6.4 **Cabin Baggage and Cabin Clutter**

6.4.1 Training is to include the areas of the cabin that are approved for the stowage of cabin baggage or other items and the areas where it would be unsafe to do so.

6.5 Brace Positions

6.5.1 Training and practice are to be given in the correct brace position for both cabin crew and passenger taking into account different seating configurations and orientation applicable to the aircraft type.

6.6 Supernumerary Sectors

6.6.1 On completion of emergency and survival training and prior to operating as a crew member, cabin crew are to operate a minimum of two supernumerary sectors on each aircraft type. The supernumerary cabin crew is required to be additional to the normal crew complement.

Note: The requirements of paragraph 6 above need not be repeated for crew who are still currently flying with the operator and have covered or practiced similar procedures in previous training provided by the same operator.

7 RECURRENT TRAINING - ALL CREW

7.1 Refresher Training

7.1.1 Operators must ensure that an organised course of refresher training is provided for all crews to prepare for the emergency survival test. Such training will have the additional advantage of allowing crews to discuss recent incidents, difficulties and emergencies which have been experienced. If none have arisen, operators should discuss possible scenarios with emphasis on what actions should be taken. Time must be allocated for this purpose. This discussion is particularly important when cabin crew are assigned to more than one type of aircraft. First aid and aviation security refresher training must also be included.

7.1.2 In addition, the refresher training shall also cover:

(a) Knowledge on human performance as related to cabin safety duties including flight crew-cabin crew coordination; and

(b) Reinforcement of Crew Resource Management.

7.2 The Annual Emergency Survival Test

7.2.1 The ANO requires that all crew be tested on aspects of emergency and survival appropriate to the aircraft type to be operated. The maximum period of validity of this test is twelve months. The Ninth Schedule makes a distinction between tests and practice and operators should apply a similar distinction in their crew training records.

7.2.2 All crew must pass a test on their knowledge of the location and use of emergency survival equipment and the appropriate drills and procedures. The test will be related to the aircraft type and cover every series and configuration. Appropriate written tests are required and must include first aid topics.

7.2.3 To demonstrate their proficiency in carrying out emergency duties, crew should practice - insofar as it is practicable and reasonable to do so- the actual movements and operations assigned to them in evacuation and other emergency drills. Such practice should include the use of emergency and life-saving equipment required to be carried, such as as life jackets, life rafts, evacuation slides, emergency exits, portable fire extinguishers, oxygen equipment/masks, protective breathing equipment, first-aid and universal precaution kits. Touch drills for opening emergency exits should be included.

7.3 **Periodic Practice**

7.3.1 At least once every 24 months aircraft crews are to carry out the following practice:

(a) the operation and actual opening of all normal and emergency exits used for passenger evacuation;

(b) extinguishing a fire, representative of an aircraft interior fire, with each type of fire extinguisher carried on board the aircraft except that, in the case of Halon extinguishers, an alternative extinguishing agent may be used;

(c) the donning and use of protective breathing equipment by each crew member in an enclosed, simulated smoke-filled environment. The duration should be at least 3 mins; and

(d) boarding a dinghy or raft from the water whilst wearing a life jacket.

7.4 **Security Refresher Training**

7.4.1 Security refresher training must be conducted for all crew. This is to keep the crew informed on the latest threat and security issues.

7.4.2 In addition, the training should also be served as a useful feedback session to review the operator's security procedures.

7.4.3 The syllabus for this training is in Appendix I.

7.5 **Dangerous Goods Refresher Training**

7.5.1 The operators must provide refresher training in Dangerous Goods for all crew. The required training contents are shown in Appendix J.

7.5.2 The operators must ensure that all its crew members have passed a written test as part of the refresher training.

7.5.3 The operators must ensure conduct annual training for its cabin crew on the types of dangerous goods which may, and may not, be carried in a passenger cabin.

8 RECURRENT TRAINING -ADDITIONAL ITEMS FOR CABIN CREW

8.1 **The Annual Emergency Survival Test**

8.1.1 Cabin crew should show a satisfactory knowledge of crowd control techniques, and if applicable, their role in the event of pilot incapacitation. Cabin crew should also undertake first aid refresher training and pass an appropriate written test.

8.2 Periodic Practice

8.2.1 Once annually, cabin crew are to demonstrate their competence in carrying out the following practical drills:

(a) use of an emergency exit and emergency evacuation slide representative to the highest of the aircraft main deck sill height operated by the cabin crew;

(b) use of each type of extinguishers carried on board the aircraft;

(c) practical rescue breathing and cardiopulmonary resuscitation using a dummy specifically designed for the purpose;

(d) boarding a slide raft/life raft with a life jacket; and

(e) use of first-aid and universal precaution kits.

9 CREW-IN-CHARGE (CIC) TRAINING

9.1 Initial Training

9.1.1 All newly appointed CIC should be given training on the following topics:

(a) items to be covered at pre-flight briefing:

- (i) allocation of cabin crew stations and responsibilities;
- (ii) aircraft type and equipment fit;
- (iii) area, route and type of operation; and
- (iv) any special category passengers such as infants, disabled or stretcher cases, etc.

(b) co-operation with the crew:

- (i) discipline, responsibilities and chain of command;
- (ii) importance of co-ordination and communications; and
- (iii) action in the event of pilot incapacitation.

(c) review of legal and operator's requirements pertaining to cabin safety:

- (i) passenger safety briefing, safety cards;
- (ii) securing of galleys;

(iii) stowage of cabin baggage;

(iv) restrictions on use of portable electronic device;

(v) procedure during turbulence;

(vi) procedures when re-fuelling with passengers on board; and

(vii) documentation.

(d) Human Factors and Crew Resource Management, including participation in flight simulator LOFT exercise if practicable;

(e) accident and incident reporting;

(f) flight and duty times limitations and rest requirements;

(g) safety on the ramp;

(h) aircraft diversion involving emergency first aid cases;

(i) minimum equipment list;

(j) aviation security matters; and

(k) use of automated external defibrillators. (if carried)

9.2 **Refresher Training**

9.2.1 In addition to the normal recurrent training, CIC should also be given annual training in the management of the following scenarios:

(a) planned crash/ditching;

(b) unruly passengers;

(c) crew incapacitation;

(d) emergency first aid cases;

(e) in-flight cabin fire;

(f) ramp safety;

(g) dangerous goods incidents; and

(h) aviation security matters; and

(i) use of automated external defibrillators. (if carried)

9.2.2 The CIC refresher training shall also include topics covered during the CIC initial training. All topics shall be reviewed once every 2 years during the refresher training.

10 APPROVAL OF AIRCRAFT EMERGENCY TRAINING APPARATUS AND OF PERSONNEL CONDUCTING TRAINING AND TESTING OF SUCH APPARATUS

10.1 Operators may wish to conduct some of their emergency training and testing on training apparatus rather than on the actual aircraft. Such apparatus and the persons controlling the apparatus must be formally approved by the Authority.

10.2 Operators wishing to obtain approval for their apparatus and personnel to conduct training and testing, should apply to the Authority. Upon satisfactory conclusion of the inspection, an approval will be issued. Renewal of the approval will be by similar inspection. The period of validity for the approval shall be 12 months.

10.3 If approval is sought for the apparatus to be used, all practical emergency survival training and testing, the apparatus will need to meet all the items in paragraph 10.4. However, approval may be sought and given for limited use of apparatus, in which case only the relevant items need to be met.

10.4 Subject to the proviso in paragraph 10.3, the apparatus should accurately represent the aircraft in the following particulars:

(a) layout of the cabin in relation to exits, emergency exits, galley areas and safety equipment stowage. Dimensions should be an accurate representation typical of aircraft in the fleet;

(b) both cabin crew and passenger seat positioning - with particular accuracy where these are immediately adjacent to exits;

(c) seat dimensions and seat pitch;

(d) operation of exits and emergency exits in all modes of operation particularly in relation to its method of operation and weight and balance;

(e) extent of movement and associated force of all controls for all equipment and services;

(f) provision of emergency equipment of the type provided in the aircraft;

(g) all cabin markings;

(h) all cabin lightings;

(i) cabin crew communications equipment and associated control panels;

(j) evacuation slides, including normal and standby methods of operation; and

(k) height and angle of inflated evacuation slides.

10.5 Operators should nominate training personnel to be approved by the Authority for the control of training apparatus. Operators must satisfy themselves that nominated personnel have the qualifications and experience to conduct such training and that they have undergone a period of training which the Authorised Officers may be assigned to observe. All approved training personnel should be mentioned in the company training manual.

10.6 An operator may arrange to use the apparatus and/or personnel of another operator. A separate approval will be required in such cases. The training given must comply with the training manual and operating procedures of the operator whose crews are being trained and items covered in the apparatus may be restricted, if significant differences of cabin layout and equipment exist.

CHAPTER 7
CABIN SAFETY

EFFECTIVE DATE : 20 APRIL 2015
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1 CABIN CREW

1.1 Age/Medical Requirements

1.1.1 A cabin crew member should be at least 18 years of age and have passed an initial medical examination or assessment and been found medically fit to discharge the duties specified in the operations manual. An operator must ensure that cabin crew members remain medically fit to discharge such duties.

1.1.2 The initial medical examination or assessment, and any re-assessment, of cabin crew members should be conducted by, or under the supervision of, a medical practitioner acceptable to the Authority. An operator should maintain a medical record for each cabin crew member.

1.1.3 The following medical requirements are applicable to cabin crew members:

(a) good general health;

(b) freedom from any physical or mental illness which might lead to incapacitation or inability to perform cabin crew duties;

(c) normal cardiorespiratory function;

(d) normal centre nervous system;

(e) adequate visual acuity - 6/9 with or without glasses and free from severe colour blindness which may interferes with the recognition of colour coded cabin signs;

(f) adequate hearing;

(g) normal weight (i.e. ability to move comfortably down the aisle, single file, facing forward and to be able to exit from the smallest secondary cabin emergency exit);

(h) normal function of ear, nose and throat; and

(i) normal height (i.e. able to stand in the aircraft, reach safety equipment and open and close overhead bins).

1.2 **Crew-in-charge (CIC)**

1.2.1 Whenever more than one cabin crew member is carried on a flight, the operator must nominate a crew-in-charge. The CIC will be responsible to the pilot-in-command for the conduct and co-ordination of the cabin safety and emergency procedures specified in the operations manual.

1.2.2 An operator shall not appoint a person to the post of CIC unless that person has at least one year's experience as an operating cabin crew member and has completed an appropriate course of training.

1.2.3 An operator shall establish procedures to select the next most suitably qualified cabin crew member to operate as CIC in the event of the nominated CIC becoming unable to operate. Such procedures must be acceptable to the Authority and take into account the cabin crew member's operational experience.

1.3 **Cabin Crew Complement**

1.3.1 An operator shall not operate an aeroplane with a maximum approved passenger seating configuration of more than 19, when carrying one or more passengers, unless the number of cabin crew members carried on board is not less than the greatest of the following:

(a) One cabin crew member for every 50, or fraction of 50, passenger seats installed on the same deck of the aeroplane; or

(b) For an aeroplance with a single aisle, one cabin crew member for each pair of directly opposing floor level exits; and for an aeroplane with more than one aisle, one cabin crew member for each floor level exit; or

(c) The number of cabin crew members determined by the manufacturer during certification of the aeroplane, whether by an emergency evacuation demonstration or by analysis, except if the operator's maximum approved passenger seating configuration is less than the manufacturer's certificated maximum passenger seating capacity by at least 50 seats, the required cabin crew complement may be reduced by one for every whole multiple of 50 seats by which the operator's maximum approved seating configuration falls below the manufacturer's certificated maximum passenger seating capacity.

1.3.2 In addition to the required cabin crew complement calculated in paragraph 1.3.1 above, the Authority may, at its discretion, require an operator to include additional cabin crew members for flights such as Ultra Long Range Operations.

1.3.3 Notwithstanding paragraph 1.3.1, in the event of unforeseen circumstances when a cabin crew member is incapacitated, the operator may operate the aeroplane with one cabin crew member less than the required cabin crew complement subject to the following conditions:

(a) The remaining number of cabin crew members shall not be less than that stated in paragraph 1.3.1(b);

(b) The flight is departing from a location where no qualified replacement cabin crew member is reasonably available;

(c) The passenger carrying capacity of the aeroplane shall be reduced by 50 seats from the manufacturer's certificated maximum passenger seating capacity for every cabin crew member below the number of cabin crew members specified by the manufacturer for that aircraft type;

Note: Where the number of cabin crew members for the particular aircraft type is not determined by the manufacturer, no operational reduction of cabin crew shall be allowed.

(d) The operation of the flight with reduced cabin crew shall be limited to one sector;

(e) All cabin crew members shall be trained and be made familiar with the procedures for reduced cabin crew operation;

(f) If the incapacitated crew is the Crew-in-Charge (CIC), the next most qualified cabin crew who meets the requirements to be a CIC shall be appointed as the CIC for that sector; and

(g) The operator shall document in its operations manual the policies and procedures for reduced cabin crew operations.

1.3.3A Notwithstanding paragraph 1.3.3 (d), the Authority may approve operation of the flight with reduced cabin crew for up to two consecutive sectors, subject to such conditions as he thinks fit, upon his being satisfied that such operation is conducted in a safe and proper manner.

1.3.4 Subject to paragraph 1.3.5, the operator need not comply with the requirements in paragraph 1.3.1 for the following types of flights:

(a) Test flights;

(b) Functional check flights;

(c) Base training flights;

(d) Delivery flights;

(e) Customer acceptance or demonstration flights;

(f) Flights conducted under a Ferry Flight Authorisation;

(g) Flights conducted under a Permit to Fly (note that additional conditions relating to cabin crew may be imposed in the Permit to Fly); and

(h) Any other flights approved by the Authority.

1.3.5 For flights described in paragraph 1.3.4, all persons carried on board shall be briefed on safety, emergency and evacuation procedures. In addition, for flights described in paragraph 1.3.4 where more than 19 persons are carried on board (excluding the flight crew), the operator shall determine the minimum number of cabin crew members required to effect a safe and expeditious evacuation of the aeroplane. At least one cabin crew shall be carried on board such flights.

1.3.6 When scheduling cabin crew for flights, rostering procedures should take into account the experience of each cabin crew to ensure that there is an even spread of experienced cabin crew members on all flights.

1.4 **Operation on more than one type or variant**

1.4.1 Cabin crew may operate up to three aircraft types provided that safety equipment and emergency procedures are similar. Nevertheless, unless subject to the approval of the Authority, cabin crew should not operate on more than one aircraft type as CICs.

1.4.2 For the purposes of paragraph 1.4.1, variants of a particular aircraft type are considered to be different types if they are not similar in all of the following aspects:

(a) emergency exit operation;

(b) location and type of safety equipment; and

(c) emergency procedures.

1.4.3 Factors taken into consideration by the Authority to permit cabin crew to operate up to 3 aircraft types would include but not limited to the following:

(a) additional training for the CICs.

(b) a minimum experience level of cabin crew comprising the minimum crew complement.

(c) restriction of the number trainee cabin crew carried on all flights.

(d) meeting a recency requirement as agreed with the Authority on all aircraft types.

(e) no change fleet assignment within the same day except for flight disruptions.

(f) arrangements made for cabin crew to review the characteristics of the aircraft type to be operated on during pre-flight crew briefing e.g. viewing of a video tape.

1.5 **Recency**

1.5.1 The operator shall ensure that any cabin crew member who has not operated as a cabin crew for more than sixty days not exceeding 6 months completes an approved course refresher training and pass a written test. The training shall include at least the requirement listed in paragraph 1.6 of this chapter.

1.5.2 The operator shall ensure that any cabin crew member who has not operated as a cabin crew for more than six months not exceeding 12 months before undertaking duties shall:

(a) complete refresher training on the type;

(b) sit for and pass all initial and appropriate aircraft type tests; and

(c) operate 2 sectors as supernumerary crew. The supernumerary cabin crew should not be counted as part of the minimum crew complement.

1.5.3 An operator shall ensure that any cabin crew who has not operated an aircraft for more than 12 months be required to complete the full initial and aircraft type rating training and pass all appropriate tests. The crew must also operate at least 2 sectors as supernumerary crew.

1.5.4 The cabin crew recency on an aircraft type will expire if the cabin crew does not operate on an aircraft type for more than 90 days. The crew member will have to successfully complete the aircraft type test before resuming flying duties on that aircraft type.

1.5.5 For cabin crew operating on 3 aircraft types, the recency on an aircraft type will expire if he or she does not operate on an aircraft type for more than 60 days. However, the recency requirement can be extended to 90 days if the cabin crew has within the 60 days operated on an aircraft type built by the same manufacturer where similar features exist. The crew member will have to successfully complete the aircraft type test before resuming flying duties on an aircraft type.

1.5.6 CICs will be required to undergo the CIC recurrent training programme in addition to paragraph 1.5.2 and 1.5.3 of this chapter.

1.6 **Refresher Training**

1.6.1 The operator shall ensure that a suitable qualified person is employed to conduct the refresher training. The training for each cabin crew member should include at least the following:

(a) emergency procedures including pilot incapacitation;

(b) evacuation procedures including crowd control techniques;

(c) operation and actual opening of all normal and emergency exits for passenger evacuation in an aircraft or approved training device;

(d) demonstration of the operation of all other exits; and

(e) location and handling of emergency equipment, including oxygen systems, portable oxygen, protective breathing equipment and the donning of life-jackets.

1.7 **Supernumerary Flying**

1.7.1 Unless otherwise agreed by the Authority, cabin crew will normally be expected to fly in a supernumerary role on a passenger flight within a period of two weeks on successful completion of their aircraft type training. This is prior to operating as a fully qualified crew. In addition, cabin crew undergoing initial training is also required to operate successfully a minimum number of consecutive sectors as supernumerary crew as agreed by the authority on each aircraft type prior to operating as a fully qualified crew. Passengers may not be able to distinguish between such trainees and fully trained cabin crew and in an emergency may expect to receive guidance and assistance from anyone wearing a crew uniform. Operators must therefore ensure that before undertaking supernumerary duties, cabin crew have successfully completed the training and testing specified in paragraphs 3,4,5 and 6 of Chapter 6. The supernumerary cabin crew should not be counted as part of the minimum crew complement.

1.8 Uniforms

1.8.1 Operators should provide crew uniforms which readily distinguish the wearer as a member of the cabin staff.

1.8.2 Protective clothing for at least two crew members, such as a quick donning jump suit manufactured from a non-thermoplastic material, should be provided for aircraft being operated in a combined passenger and cargo role.

1.8.3 Operators should exercise care in the provision of cabin crew footwear . Appropriate footwear should be worn during take-off, landing and emergency situations to avoid damage to slides and to offer protection to the cabin crew.

1.8.4 All ornaments worn around the neck and unconcealed by clothing have the potential to snag and hamper movement. These items be a cause of injury to the wearer. Both the restriction of movement and the risk of injury that may occur when neck chains are worn have the potential to inhibit crews from carrying out their duties. Operators must therefore instruct crews to remove unconcealed neck ornaments when on board aircraft. If there is a requirement that ID cards must be displayed, other forms of attachment must be used, care being taken to ensure that this does not present a risk of snagging.

1.9 Operations Manual (SEP)

1.9.1 On each flight, every cabin crew must have access to a copy of every part of the operations manual (SEP) which is relevant to his duties on the flight.

2 CABIN SAFETY MANAGEMENT

2.1 Pre-departure Procedures

2.1.1 Operators should establish check-in and boarding gate procedures and, where applicable, training for their traffic staff and handling agents. Emphasis should be placed on the need for these personnel to identify and resolve potential difficulties in seat allocation (see also paragraphs 2.2 and 2.3 of this chapter), excess cabin baggage, the carriage of dangerous goods, drunken or unruly passengers, including boarding refusal, before passenger embarkation begins. This is of particular importance at overseas departure points.

2.1.2 Similar instructions and training should also be given to cabin crew to deal with cabin safety related problems which may have been missed at check-in.

2.2 **Seat Allocation**

2.2.1 The following types of passengers should not be seated where they could obstruct floor level emergency exits, impede the crew in their duties, obstruct access to emergency equipment or hinder aircraft evacuation :

(a) Passengers with restricted mobility (hereinafter referred to as “PRMs”), which shall include persons with a physical or intellectual disability and persons who are impaired due to any other cause;

(b) elderly or frail person who appear to be not capable of operating or assisting with the operation of exit;

(c) accompanied and unaccompanied children and infant;

(d) deportees or prisoners in custody; and

(e) obese passengers.

2.2.2 PRMs shall be allocated seats in pre-assigned locations designated by the operator and agreed to by the Authority.

2.2.3 A passenger who would not be able to use a staircase without assistance shall not be allocated a seat in the upper deck of an aircraft where the primary means of evacuation (land or ditching evacuation) from the upper deck cabin requires the use of a staircase from the upper cabin to the main deck cabin.

2.2.4 Number of Passengers with Restricted Mobility (PRMs)

(a) Where PRMs are carried on a flight, the number of PRMs shall not exceed the number of able-bodied persons (ABPs) capable of assisting with an emergency evacuation.

(b) The maximum number of PRMs permitted to be carried on any particular flight will depend on the type and configuration of the aircraft as well as extent of the reduced mobility or disability of the PRMs seeking embarkation. The approved maximum number shall not be exceeded.

2.3 **Seat Allocation at Self-Help (Types III and IV) Exits**

2.3.1 Seats which form the access route from the cabin aisle to these exits should only be allocated to passengers who appear capable of operating and/or assisting with the operation of the exit. Check-in staff shall be mindful of this requirement.

2.3.2 On no account should the types of passengers listed in paragraph 2.2.1 be allocated seats which form the access route from the cabin aisle to these types of exit. Preference should be given, where possible, to seating non-operating crew at these locations.

2.4 **Drunken Passengers**

2.4.1 Paragraph 47 of the ANO states that "A person shall not enter any aircraft when drunk or be drunk in any aircraft".

2.4.2 Operators are to provide instructions, advice and training to all relevant staff on dealing with passengers who have been drinking excessively. Such advice should include when to deny boarding rights and reiterate the pilot-in-command's prerogative to exercise the powers, as conferred by the ANO, to protect the safety of the aircraft and passengers.

2.4.3 Drunken passengers constitute not only a possible source of annoyance to fellow passengers but also a hazard to flight safety. Potentially hazardous incidents should be reported in the incident occurrence report.

2.5 Stowage of Cabin Baggage

2.5.1 Cabin baggage may only be stowed in approved locations. Operators should provide clear and unequivocal advice on which areas are approved.

2.5.2 Overhead lockers and other stowages must be clearly placarded with weight limitations and enclosed by latched doors or load bearing nets as appropriate. Cabin crew must be made aware of the need to ensure that limitations are not exceeded.

2.5.3 Underseat stowages may only be used if the seat is equipped with a restraint bar and the baggage is of a size to fit under the seat.

2.5.4 Baggage must not be stowed in toilets, immediately forward or aft of bulkhead, or in such a manner that it will impede access to emergency equipment. Particular attention must be paid to maintaining the integrity of all evacuation routes.

2.6 Stowage of Catering Supplies and Crew Effects

2.6.1 All catering supplies, blankets, pillows, newspapers, etc are to be securely stowed in approved areas for take-off and landing.

2.6.2 Similarly, crew effects, including baggage and clothing, must be stowed in approved areas. Particular care must be taken to ensure that doors and exits, including operating handles, are not obstructed nor ready access to emergency equipment precluded.

2.7 Carriage of Aerosols

2.7.1 Advice and instructions should be provided to crew on the carriage of aerosols. In particular, the potential fire hazard posed, and how this may be obviated by careful stowage should be emphasised.

2.7.2 Unless it is unavoidable, aerosols should not be used for dispensing air fresheners, insecticides or other similar agents.

2.8 Portable Electronic Devices (PED)

2.8.1 The operator shall not permit the use of a PED on board an aircraft except as provided for in paragraphs 2.8.2 and 2.8.3.

2.8.2 An operator may permit the use of a PED on board an aircraft:

(a) if the PED is an unintentionally transmitting PED or an intentionally transmitting PED with its transmitting function disabled, when the aircraft is operating at an altitude of above 10,000ft;

(b) after the aircraft has exited the runway upon landing;

(c) if it is a PED that has very low power consumption, such as a heart pacemaker, hearing aid or digital watch; or

(d) if it is a medical PED, such as an automated external defibrillator or a portable oxygen concentrator, that has been approved for use in the aircraft.

2.8.3 An operator may permit the use of a PED on board an aircraft in the following circumstances if he has obtained the approval of the Authority under paragraph 2.8.6:

(a) unintentionally transmitting PED or intentionally transmitting PED with transmitting functions disabled, when the aircraft is operating at an altitude of 10,000ft or lower; or

(b) intentionally transmitting PED with transmitting functions in active mode when the aircraft is operating at any altitude;

2.8.4 Notwithstanding paragraphs 2.8.2 and 2.8.3,

(a) the operator shall not permit the use of a PED for voice communications on board an aircraft except when the aircraft has exited the runway upon landing; and

(b) the operator shall not permit the use, or shall terminate any permitted use, of a PED on board an aircraft when its use may interfere, or is suspected of interfering, with the performance of the navigation and communication systems of the aircraft.

2.8.5 The operator shall ensure that when any PED is used on board an aircraft that:

(a) the use of the PED will not interfere with the performance of the aircraft's navigation and communications systems,

(b) there are established procedures for ensuring that the use of the PED complies with paragraph 2.8; and

(c) crew members are assigned responsibilities and trained for ensuring the safe use of the PED.

2.8.6 The Authority may grant an approval required by an operator under paragraph 2.8.3 upon an application made by the operator with the submission of the following documents:

(a) a report of the safety risk assessment and required certification tests as necessary conducted on the tolerance of the aircraft to PED radio frequency interference to ascertain that the use of the PED in the required modes will not interfere with the performance of the navigation or communications systems of the aircraft;

(b) the appropriate manuals containing written procedures that include the following:

(i) the assignment of responsibilities to crew members for ensuring the safe use of PED;

(ii) the procedures to isolate or prohibit the use of PED should interference from PED be suspected or is ascertained; and

(iii) the required training of the crew members.

2.8.7 The operator shall inform the passengers of the permissible times, conditions and limitations for the use of PED.

2.8.8 Notwithstanding any use of PED permitted by the operator, the pilot-in-command has the right to terminate the use of any PED.

2.8.9 An operator shall obtain an approval from the Authority if it provides or intends to provide a PED as part of its In-Flight Entertainment or other services on board the aircraft.

2.8.10 For the purpose of this paragraph:

(a) an intentionally transmitting PED means a PED that intentionally transmits electromagnetic signals; and

(b) an unintentionally transmitting PED means a PED that emits electromagnetic signals as a by-product of its operation.

2.9 Spillage of Drinks in flight deck

2.9.1 There is an obvious potential for a major incident to occur when such items as conductive liquids in open containers, cutlery, etc; are mishandled on aircraft flight decks. All operators are requested to review their procedures for handling drinks and other items in and around the flight deck, as appropriate. Clear advice should be given to all crew on how best to route drinks when passing them about, so as to avoid any risk of accidental spillage on to electrical equipment.

2.10 Safety on the Ramp

2.10.1 An operator is required to provide procedures on the following:

(a) Use of airbridges and other means of embarkation/disembarkation for the purposes of evacuation of passengers.

(b) Allocation of responsibilities between ground handling agent and cabin crew for passenger safety during embarkation and disembarkation to ensure their individual emergency procedures are compatible and effective.

(c) Appropriate training must also be provided to all ground staff who are required to operate the aircraft door on the ramp.

2.11 Use of Cabin Crew Seat by a Person Other than a Cabin Crew

2.11.1 The operator shall not permit a cabin crew seat to be occupied by a person other than a cabin crew except in accordance with 2.11.2 below.

2.11.2 An operator may, subject to the approval of the Authority indicated in the operator's Operations Manual, permit a person other than a Cabin Crew to occupy a Cabin Crew Seat for landing only if :

(a) the number of cabin crew manning emergency exits falls below the minimum cabin crew complement during flight due to unexpected crew incapacitation; or

(b) during a declared emergency where the person is an able-bodied person displaced from a passenger seat to a cabin crew seat in order to enhance evacuation management. This person must be briefed on the necessary safety procedures, including activation of the exit door, etc, before being permitted to occupy a cabin crew seat and to assist in evacuation management.

2.12 Egress and Evacuation Routes

2.12.1 The operator shall ensure that the passenger's egress and evacuation routes are free of obstructions during takeoff and landing.

3 SAFETY BRIEFING

3.1 Passenger Briefing

3.1.1 Passengers are to be given a pre-departure briefing, without distraction by other cabin activities. The briefing should cover all relevant points appropriate to the aircraft type and operation being undertaken. Briefings are to be given in English, and in any other language where passenger demography so requires. When audio-video presentation is utilised, the audio text is to be in English, with each text accompanied by synchronised sub-titles of the language where passenger demography so requires. The following points must also be highlighted in the demonstration or video:

(a) seat belt operation;

(b) location of emergency exits, including any unserviceabilities;

(c) life-jacket operation, where required; and

(d) operation of drop-out oxygen, where required.

Passengers' attention must be drawn to smoking restrictions; when appropriate, the availability of infant life-jackets or flotation device; the need for children's and babies oxygen masks to be fitted after those of their accompanying elders; and advice on wearing seat belts at all times.

3.1.2 The location of floor lighting systems must be included in the briefing and, where possible, the system should be activated for a few seconds.

3.1.3 Passenger's attention should be drawn to the safety card and mention made of the instructions for operating any types III and IV exits.

3.1.4 Attention should also be drawn to restrictions on the use of personal electronic devices, including mobile telephones. This is to be repeated prior to landing.

3.1.5 Where briefings are given by the use of a video presentation, cabin crew must monitor screens to ensure that each passenger receives a full briefing. In larger aircraft, it is preferable that cabin crew should also physically indicate the nearest available exit to the passenger during the briefing. Where passengers have not received, or cannot receive (because of location), a full briefing by video, individual briefings must be given.

3.1.6 Operators should ensure that their crew drills include a procedure for passengers to be warned of impact so that they can adopt the brace position at the appropriate time before impact.

3.1.7 Special personalised briefings for handicapped passengers (e.g. the blind, the hearing impaired and to a passenger who is responsible for another person on board (e.g. infants) should also be carried out).

3.1.8 Prior to landing, another passenger briefing must also be carried out to cover the following:

(a) carry on baggage stowage compartment;

(b) correct seat back and chair table positioning;

(c) seat belt requirements; and

(d) on flights scheduled for 6 hrs or more, the location of the emergency exits.

3.2 Passenger Safety Cards

3.2.1 The passenger safety briefing must be supplemented with a pictorial safety notice relevant to the type of aircraft and its safety equipment (passenger safety card). Information contained in the card must be lodged with the Authority.

3.2.2 The card is to be designed and produced as an entity separate from any other literature. It should be located so that the seated passenger can readily see and identify it. A distinctive message that it contains safety information should be placed at the top of the card.

3.2.3 Equipment and operating methods should be depicted pictorially, using internationally recognised symbols wherever possible. Any wording should be kept to a minimum.

3.2.4 Passenger safety cards must provide the following information:

(a) seat belts - instructions for fastening, adjusting and unfastening;

(b) useable exit location - routes to exits should be indicated for crash landing and ditching. This includes overwing emergency exits where the emergency escape routes from the cabin, via the wing to the ground should also be clearly depicted;

(c) exit operation - for all types of exit fitted. Illustrations should depict the operation of the exit with the direction of the movement of handles clearly indicated;

(d) use of evacuation slides - depicting the correct method of use, the manual inflation handle and discarding high heeled shoes;

(e) brace positions - for all types of seat orientation and pitch in use of the aircraft;

(f) oxygen masks - instructions of locating, donning and adjusting the mask; initiating oxygen flow. Instructions should be given that masks should be fitted to children only after their guardians have fitted their own;

(g) life-jackets - removal from stowage, removal from container and inflation. The card must show that, excepting children, the life-jackets must not be inflated within the cabin; and

(h) life-raft - location, removal, preparation for use; inflation and launching. Launching locations should be indicated.

(i) smoking restrictions;

(j) seatbacks and trays - upright and stowed for take-off and landing; and

(k) emergency floor path lighting systems.

4 CABIN CREW DUTIES

4.1 Pre-flight Briefings

4.1.1 Cabin crew should be given a safety briefing prior to the commencement of any flight or a series of consecutive flights, after each full rest period. Consideration should be given to the following:

(a) areas dedicated to pre-flight briefings usage that afford privacy should be provided;

(b) copies of the relevant safety equipment and procedures manual and current safety notices must be available;

(c) cabin crew should answer satisfactorily at least one question on aircraft safety (emergency drills, safety equipment location and usage) or one on first aid;

(d) the allocation of cabin crew to specific seats in the passenger compartment, where applicable, should take due account of the need to ensure that no area is devoid of persons who have experience in the conduct of safety-related duties;

(e) safety reminders that address any recent changes to safety-related issues or any perennial problems should be given; and

(f) action to be taken by the CIC, if it becomes apparent that any crew member displays inadequate knowledge of safety-related issues.

4.2 **Allocation of Cabin Crew Stations**

Arrangements should be made, preferably during rostering, to ensure an even spread of experienced cabin crew through the aircraft. CICs should allocate duties and positions on the day with this in mind. The CIC must occupy an approved crew seat for all take-offs and landings.

4.3 **CIC Seating**

When the assigned crew station of the CIC does not allow immediate access to the flight deck, operators must specify drills which reflect the following:

(a) the cabin crew seated closest to the flight deck should be responsible for communicating with the flight deck crew in the event of any emergency on take-off or landing; and

(b) emergency evacuation procedures should require CIC to remain at his or her station and to control and operate the emergency exits.

4.4 **Checking of safety equipment**

4.4.1 Cabin crew operating a flight must ensure all the safety equipment carried on board the aircraft is in working condition and that their location and complement are in accordance with the operations manual. The checking of safety equipment is also to be carried out whenever there is a change of crew.

4.5 **Embarkation and Disembarkation of passengers**

4.5.1 Instructions should be available to crews for marshalling of passengers at stations where ground handling staff are unavailable.

4.6 **Arming and Disarming Slides**

4.6.1 Slides should be armed as soon as obstructions to their deployment (steps, jetties, etc) are removed and clear. Slides should remain armed after landing until arrival 'on stand'. Crews should be aware of the dangers of accidental deployment.

4.7 **Duties prior to take-off and landing**

4.7.1 Each cabin crew member assigned to emergency evacuation duties shall occupy an approved cabin seat in the passenger cabin during take-off and landing. Cabin crew should remain at their stations with their seat belt fastened, except when performing duties related to the safety of the aircraft and passengers.

4.7.2 The operator shall not permit a cabin crew seat to be occupied during take-off and landing by a person other than a functional cabin crew member unless otherwise approved by the Authority.

4.7.3 All catering and other equipment shall be stowed prior to take-off and landing.

4.7.4 All items of galley electrical equipment should be switched off prior to take-off and landing.

4.7.5 The operator shall ensure that at any time when the aircraft is on the ground, provision for the safety and rapid evacuation of the passengers in an emergency is maintained.

4.8 **Cabin lights and window shades for take-off and landing**

4.8.1 The dimming of interior cabin lights particularly when taking-off and landing at night and stowing of passengers window shade in the open position (when applicable) for take-off and landing should be carried out.

4.9 **Refuelling operations with passengers on board**

4.9.1 When operators wish to refuel aircraft with passengers on board, instructions should be issued to crews. Instructions should cover at least the following points:

(a) aircraft steps and jetties and cabin crew positions;

(b) smoking prohibition;

(c) briefing to passengers on restrictions on use of electrical equipment, no smoking rule, etc;

(d) slide arming and clearance area;

(e) ensure seat belt signs are off to facilitate sudden evacuation; and

(f) ensure cabin safety lighting is switched on.

4.10 **Flight crew and cabin crew liaison**

4.10.1 Operator's instructions should be clear on the need for good liaison to exist between flight and cabin crew.

4.10.2 A means must be established for the conduct of liaison. Such liaison should extend until after the aircraft has arrived at its final destination where, for instance, cabin safety equipment defects may need to be attended to.

5 SAFETY, EMERGENCY AND SURVIVAL EQUIPMENT

5.1 Provision of oxygen equipment

5.1.1 The amount of oxygen to be carried and the number of passengers for whom suitable masks must be made available vary with operating altitude, attainable rate of descent and Minimum Safe Altitude (MSA).

5.1.2 Information and instructions must be provided by the operator to his operating staff to ensure that flights may be conducted in accordance with the relevant legislation. Any aircraft which is not correctly equipped must be appropriately restricted in its use, e.g. by imposition of operating altitude or route restrictions, until such time as an appropriate scale of oxygen and equipment is fitted or repairs effected.

Note: Information on the dangers of explosion caused by the proximity of any oxygen equipment, including therapeutic oxygen, to any naked flame or incipient fire must be stressed.

5.1.3 Where a Pre Recorded Announcement facility is fitted, operators should review post decompression procedures and public address announcements to ensure that passengers receive information relevant to the use of the oxygen system as soon as possible after a decompression.

5.2 Re-stowage of oxygen masks

5.2.1 It is recommended that cabin crew do not attempt to re-stow oxygen masks after deployment. Damage to the equipment and possibly cabin crew injury may result. Re-stowage of such equipment should be undertaken by maintenance personnel only.

5.3 Portable protective breathing equipment

5.3.1 Portable Protective Breathing Equipment (PPBE) must be approved by the Authority. Advice on which equipment has been approved may be obtained from the Authority.

5.3.2 PPBE units are to be stowed as close to the crew station as practicable and must be readily accessible. Pre-flight serviceability checks must be carried out.

5.3.3 Operators should ensure that transportation security or any other seals are removed prior to installation on the aircraft.

5.4 Carriage of tropical and polar survival equipment

5.4.1 Details for the carriage of tropical and polar survival equipment may be obtained from the ANO.

5.5 Waste Containment

5.5.1 All receptacles for towels, paper and other waste are to be constructed of materials resistant to fire as required by the relevant airworthiness requirements.

5.5.2 Waste bags do not need to be approved by the Authority. It is, however, the responsibility of the operator to control the quality of their waste bags in order that resistance to fire is maintained; the fire containment must be demonstrated with a test.

5.5.3 Waste bags may only be stowed in toilet compartments during the final phases of flight, provided that they contain low density waste such as paper and plastic cups.

6 ABNORMAL AND EMERGENCY PROCEDURES

6.1 Turbulence

6.1.1 If turbulence is forecast, the pilot-in-command should brief the CIC prior to departure.

6.1.2 When turbulence is encountered, the pilot-in-command should direct appropriate action via the CIC.

6.1.3 If in-flight service is to be discontinued, whenever possible, without imperilling personal safety, cabin crew should undertake to ensure that service equipment are secured and passengers are seated with their seatbelts fastened.

6.1.4 Cabin crew should take their seats and fasten their seat harness as soon as possible.

6.2 Cabin Fires

6.2.1 Cabin crew must continually survey the aircraft cabin and galley areas for potential and existing fires.

6.2.2 Additionally, a frequent check of toilet areas must be undertaken, ensuring in particular that smoke sensors remain unblocked.

6.2.3 On detecting a fire and/or smoke, the flight crew must be informed immediately of its location, source and severity and be kept informed as the situation develops.

6.2.4 After a fire has been extinguished, the area around it must be monitored for potential re-ignition.

6.3 Oven Fires

6.3.1 Oven fires can be caused by a variety of factors, and the dangers of which would be minimised by thorough inspections of ovens both for cleanliness and for the presence of foreign objects.

6.3.2 The primary hazard from an oven fire occurs when the door of a heated oven is opened. The introduction of outside oxygen can cause a flash fire. In dealing with an oven fire or oven overheat, the following procedure are recommended:

(a) isolate the electrics and keep the door closed. In most incidents, the fire will self-extinguish;

(b) monitor the situation. Have a fire extinguisher, fire gloves and protective breathing equipment (PPBE) at hand; and

(c) if the situation worsens, or it is thought that fire still exits in the oven, open the oven door just enough to insert the nozzle of the fire extinguisher. Insert the nozzle of the fire extinguisher and discharge a small amount of the extinguishant; consideration should be given to donning PPBE and fire gloves prior to opening the oven door. Close the oven door and monitor the oven. Repeat this procedure if necessary.

6.4 **Precaution on the use of therapeutic oxygen**

6.4.1 The use of therapeutic oxygen whilst fire-fighting is extremely hazardous since therapeutic oxygen may itself feed the fire, thus resulting in severe injuries to the crew member wearing the equipment. Additionally, therapeutic oxygen equipment only provides a low supplemental oxygen flow which will afford little relief in a smoke-laden atmosphere.

6.5 **Pressurised Cabins – Use of Exits**

6.5.1 Problems can occur if an exit is forced open when the aeroplane has not been fully depressurised. The exit will rapidly open, with the associated danger that the person operating the exit may be ejected from the cabin with possible serious consequences. Residual pressurisation may result from system malfunction or incorrect application of procedures.

6.5.2 Prevention of accidents and incidents involving aeroplane pressurisation requires correct actions to be taken by both flight deck crew and cabin crew. Operators are required to ensure flight deck crew and cabin crew are able to recognise any indication that the aeroplane is pressurised and that any attempt to open the exits should only be made when complete depressurisation has been achieved. Indication of a pressurisation problem might be evident by system design or by abnormally high operating loads on the exit handle.

CHAPTER 8

ARRANGEMENTS FOR ENGINEERING AND MAINTENANCE SUPPORT

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1 GENERAL

1.1 This Chapter prescribes the requirements for the operator's arrangements for engineering and maintenance support for aircraft covered by the AOC. The arrangements should commensurate with the number, type and complexity of the aircraft and the area and type of operations.

Note: (1) Other requirements may be specified for operators whose operations are of a limited nature and scope.

(2) Alternative arrangements may be permitted for some engineering functions to be undertaken by other organisations. This will depend on the organisation being approved for the purpose and being of an equivalent standard to that specified herein, and on the establishment of a system of management control by the operator to ensure that proper co-ordination and control exists over the planning and conduct of all work undertaken on his behalf.

2 ENGINEERING EXPOSITION DOCUMENT

2.1 The operator shall develop an Engineering Exposition Document (also termed as Maintenance Control Manual) to describe the procedures necessary to ensure all scheduled and unscheduled maintenance is performed on the operator's aircraft on time and in a controlled and satisfactory manner. The Engineering Exposition Document shall also describe the maintenance arrangements to support the operator's operation. Contents of the Engineer Exposition Document shall be in accordance with the requirements of this Chapter. The design of the Engineering Exposition Document should also observe Human Factors principles. The operator shall ensure that the Engineering Exposition Document is amended as necessary to keep the information contained therein up-to-date. The contents of the exposition shall address all of the subjects included in this Chapter, and in particular :-

(a) a description of the administrative arrangements between the operator and the maintenance organisation, if engineering and maintenance support is contracted out;

(b) a description of the maintenance procedures and the procedures for completing and signing of certificates of maintenance review and release to service when maintenance is not subcontracted out;

(c) names and duties of the person or persons required by paragraph 4.1 of this Chapter;

(d) a reference to the maintenance schedules required by paragraph 8.2 of this Chapter;

(e) a description of the methods used for the completion and retention of maintenance records required by SAR Section 4 and 8.13 of this Chapter;

(f) a description of any reliability or condition monitoring programme and any associated reporting procedures required by paragraph 8.4 of this Chapter;

(g) a description of the procedures for assessing continuing airworthiness information and implementing and resulting actions as required by paragraph 8.14 of this Chapter;

(h) a description of the procedures for implementing action resulting from mandatory continuing airworthiness information;

(i) a description of establishing and maintaining a system of analysis and continued monitoring of the performance and efficiency of the maintenance schedules, in order to correct any deficiency in the schedules;

(j) a description of aircraft types and models to which the Engineering Exposition Document applies;

(k) a description of procedures for ensuring that unserviceabilities affecting airworthiness are recorded and rectified;

(l) a description of the procedures for advising the Authority of significant in-service occurrences as required by paragraph 8.6 of this Chapter;

2.2 The exposition and subsequent amendments shall be submitted to the Authority for approval.

2.3 Copies of all approved amendments to the Engineering Exposition Document shall be furnished promptly to the Authority and all organisations or persons to whom the manual is issued.

3 ENGINEERING AND MAINTENANCE SUPPORT

3.1 The operator is responsible that maintenance on his aircraft are performed in accordance with the Singapore Airworthiness Requirements and that the aircraft are maintained in an airworthy condition. The operator shall also ensure that the Certificate of Airworthiness of each aircraft remains valid.

Note : General requirements for aircraft maintenance, including the operator's responsibilities, are in the Singapore Airworthiness Requirements Section 4 Chapter 4.1.

3.2 The operator shall satisfy the Chief Executive that the engineering and maintenance support arrangements (i.e. the personnel, accommodation, equipment and facilities, organisations, procedures and documentation provided for the engineering and maintenance support of the aircraft operated by the AOC) are to a satisfactory standard.

3.2A The operator may:

(i) have its own maintenance organisation that is approved by the Chief Executive in accordance with SAR-145; or

(ii) contract out the maintenance to an organisation approved by the Chief Executive in accordance with SAR-145.

3.2AA In addition, the operator may carry out line maintenance on its aircraft that does not need the use of complex tools or equipment that required extensive setting up or specialised training, and shall specify the scope of line maintenance in the Maintenance Control Manual if it does so.

3.3 The operator remains responsible for the safe operation of his aircraft when the accomplishment of maintenance is contracted out and must therefore be satisfied with the standards of airworthiness achieved by the maintenance contractor. The operator shall monitor the maintenance contractor's response to the provisions of the maintenance agreement, employing such technical resources as are necessary to achieve this task.

3.4 Maintenance support arrangements shall be based on an organisation approved by the Authority under the SAR-145 for the maintenance or overhaul of the type of aircraft concerned.

3.5 For the purposes of the AOC, maintenance is taken to include the overall control of airworthiness and the accomplishment of scheduled and unscheduled servicing and inspection tasks.

3.6 The operator shall have management systems to ensure effective engineering support of his fleet of aircraft over the whole of the routes operated. Quality control and assurance shall be exercised as necessary to achieve satisfactory standards of continuing airworthiness.

4 PERSONNEL

4.1 The chief executive officer of the operator shall nominate the following persons for the Authority's acceptance:

(a) A senior person acceptable to the Authority, who is directly responsible to the chief executive officer for the co-ordination of all departments concerned to ensure that the administration and control of all activities and the arrangements for engineering and maintenance support for aircraft covered by the AOC are in compliance with the ANO, the Air Operator Certificate Requirements, the Singapore Airworthiness Requirements and any other requirements that the Authority may stipulate from time to time, and in accordance with the Engineering Exposition Document. This person shall be authorised to liaise directly with the Authority on all matters affecting airworthiness.

(b) Heads of department and other senior members of the staff as appropriate to the activities of the organisations.

(c) A person nominated to authorise appropriately qualified persons to be signatories of relevant certification documents.

4.2 These nominated persons shall be capable and responsible persons who are conversant with the ANO, the Air Operator Certificate Requirements, the Singapore Airworthiness Requirements and the relevant Annexes to the Convention on International Civil Aviation, and have adequate qualifications and experience for the duties concerned.

4.3 The staff in all appropriate technical departments shall be of sufficient number, and shall have the training, competency and experience as may reasonably be expected to undertake the volume and type of work for which approval is sought.

4.4 The set up of the organisation shall be such as to ensure that in all matters affecting airworthiness, full and efficient co-ordination exists within departments, between related departments, and with external agencies.

4.5 All staff, including holders of Aircraft Maintenance Engineer licences, who are required to issue Certificate of Maintenance Review and Certificate of Release to Service shall be authorised by the person nominated to do so under the approval.

4.6 Persons authorised by the person nominated to do so under paragraph 4.1(c) shall be provided with copies of their approvals, preferably in card or booklet form, recording the following details:

(a) Name of organisation.

(b) Holder’s name and signature.

(c) The CAAS Approval reference number of the organisation and the holder’s individual approval number.

(d) Details of the aircraft, engines, systems, equipment and maintenance tasks for which approvals have been granted, the scope of each approval and its date.

(e) A statement of any conditions of issue, including a statement to the effect that such approval is valid only so long as the holder is in organisation’s employment.

4.7 Personnel records shall be kept, clearly indicating the basis upon which approvals have been granted. The records shall also include details of any Aircraft Maintenance Engineer licence held, training satisfactorily completed and the result of any written or oral assessment by the person responsible for granting the approval.

5 STAFF STRENGTH

5.1 The operator shall ensure that there is a sufficient number of staff, including qualified maintenance personnel to meet the demands of his operations. The operator shall ensure that support appropriate to his route pattern, transit frequency and maintenance requirements are provided at main bases and route stations.

5.2 Shift duty periods shall be adequately staffed to effectively enable scheduled and unscheduled tasks to be performed. Adequate staff shall be made available to perform tasks of airworthiness significance in a proper manner. Company policies in respect of maintenance personnel duty periods should be made known to the Authority.

5.3 The operator shall ensure that licensed and approved personnel are appropriately qualified to perform the tasks required, including the issue of Certificates of Maintenance Review and of Certificates of Release to Service for Scheduled Maintenance Inspections and the rectification of defects.

5.4 If maintenance support is contracted out, the operator shall ensure that the maintenance contractor meets the requirements of this paragraph.

6 STAFF STANDARDS AND TRAINING

6.1 General

6.1.1 The operator shall satisfy the Authority that its staff are adequately qualified. The operator shall provide adequate training facilities of its own or make contractual arrangements for such training using external sources to the satisfaction of the Authority.

6.1.2 Support appropriate to the route pattern transit frequency and maintenance requirements of the operator shall be provided at main bases, operational bases and route stations.

6.2 Scope of Training

6.2.1 Training shall be provided for those management, supervisory and quality personnel who are responsible for supervising the engineering support for the aircraft type(s) included in the AOC and for issuing the relevant Certificates of Release to Service and Certificates of Maintenance Review. Course syllabi shall include formal instruction and practical experience.

6.2.2 The number of supervisors, inspectors, quality engineers and mechanics to be trained before the introduction of a new type of aircraft into service shall take into account the complexity and numbers of the type, the anticipated pattern of aircraft utilisation and the organisation’s previous experience of aircraft with similar characteristics.

6.2.3 An adequate number of mechanics shall receive aircraft and systems familiarisation training on the particular aircraft types and on related maintenance practices. Mechanics to be granted limited inspection approval shall be given specific training appropriate to that approval and to the satisfaction of the Quality Manager.

6.2.4 Provisions shall be made for continuation training in accordance with a programme acceptable to the Authority.

6.2.5 The operator shall ensure that a programme of training is available to ensure that:

(a) All maintenance personnel are adequately trained to perform the duties required of them.

(b) Personnel required to issue Certificates of Maintenance Review and Certificate of Release to Service receive familiarisation training on the aircraft type and instruction in the correct operation of the operator's airworthiness control procedures to enable them to perform these tasks on the type of aircraft for which support is being provided.

(c) Persons contracted to perform line maintenance tasks through maintenance agreements are trained in any significant differences which exists between the operator's aircraft and that which they are normally employed to maintain together with any relevant company procedures they are required to observe.

(d) Personnel engaged in maintenance-related tasks receive continuation training covering any changes to the aircraft and its maintenance, taking into account the result of in-service experience gained by the operator and that published by the aircraft, engine and equipment manufacturers. Attention shall also be paid to changes in company procedures, the ANO and requirements of the Authority.

(e) Personnel engaged in maintenance related tasks receive training in human factors.

6.2.6 Records shall be maintained of training undertaken by personnel including any results of assessments or examinations.

6.2.7 Training shall include formal instruction and practical experience.

6.2.8 Management, Quality Assurance and other relevant personnel should be trained in the techniques of maintenance management and the achievement of airworthiness appropriate to the posts held.

6.2.9 The number of maintenance personnel, including management, supervisors, quality audit staff and mechanics to be trained before the introduction into service of a new type of aircraft shall be agreed with the Authority. Numbers should take into account the complexity of the aircraft and its systems, the fleet size, the anticipated pattern of aircraft utilisation and the organisation's previous experience of similar aircraft.

7 CONTRACTED OUT MAINTENANCE

7.1 General

7.1.1 The management and accomplishment of engineering and maintenance support may be achieved by the operator using his own or an associated maintenance organisation.

Alternatively all or part of the arrangements may be contracted to a separate organisation approved by the Authority.

7.1.2 Contracted arrangements for engineering and maintenance support do not absolve the operator from the overall responsibility for ensuring the safe operation and continuing airworthiness of the aircraft.

7.1.3 Where the operator does not maintain the aircraft he operates using only his own resources, full detail of the division of responsibilities between the operator and the contracted maintenance organisation must be included in an agreement between the two parties. Matters to be addressed in such an agreement are contained at Appendix G. A copy of the maintenance agreement shall be submitted to the Authority.

7.1.4 Where an operator contracts out part or all of the maintenance to a separate organisation, he shall nominate a person for engineering liaison purposes. This person will be responsible to the operator; for planning the timely presentation of the aircraft to the maintenance support organisation for all contracted maintenance; for liaison on all matters relating to the maintenance contract or agreement and for airworthiness matters affecting the safe operation of the aircraft.

7.1.5 The operator's representatives shall visit the contracted maintenance organisation at the inception of the agreement, and periodically thereafter, to ensure that the standards agreed are being maintained. Reports of all such visits shall be kept and made available to the Authority on request.

7.1.6 An arrangement whereby more than one maintenance organisation is contracted by an operator in respect of the airworthiness control of a particular aircraft type will not be acceptable to the Authority except for maintenance support at route stations or where a distinct division of aircraft is established, e.g. different maintenance schedules apply.

7.1.7 An operator may only arrange separately with other contractors apart from the principal contractor for the maintenance, overhaul and repair of engines and other components provided such arrangements do not jeopardise the agreed airworthiness control responsibility of the principal contractor.

7.1.8 In order to be able to discharge his responsibilities for continued airworthiness and to issue Certificates of Maintenance Review (CMR) the operator shall ensure on a continuing basis that the requirements of the approved maintenance schedule are being complied with, including condition monitoring and reliability reporting, and be made aware of any significant performance trends.

7.1.9 Responsibilities for the assessment and incorporation of manufacturer's Service Information and for compliance with mandatory requirements shall be clearly defined in the agreement.

7.1.10 In its assessment of the overall engineering support arrangements provided by the operator, the Authority may examine or request copies of all agreements, including side letters and addenda, between the parties concerned.

7.1.11 The Authority shall be notified at least one month in advance of any proposal to change the maintenance arrangements, e.g. a change to another maintenance organisation or significant organisational, procedural or technical change to a maintenance agreement.

7.1.12 Arrangements other than in accordance with this chapter will need to be specifically agreed with the Authority.

7.2 Contracting out Full Support

7.2.1 The operator may contract full maintenance support to an organisation approved by the Authority in accordance with SAR-145 for the maintenance or overhaul of the type(s) of aircraft concerned.

7.2.2 The operator shall ensure that the maintenance organisation competently discharges its responsibilities under the agreement, to his satisfaction, and is responsible for satisfying the Authority that the organisation meets the requirements of this Chapter insofar as they relate to the contracted work.

7.2.3 Written agreements shall be drawn up between the operator and the maintenance organisation to clearly define what responsibility for action is allowed to the maintenance organisation without prior consultation, and what tasks require agreement by the operator.

7.2.4 Whenever an aircraft is presented for scheduled or unscheduled maintenance it is essential that a precise indication is given of the inspections required, all defects known to exist on the aircraft plus any additional work required to be carried out (after consultation with the maintenance organisation as necessary).

Note: Operators must appreciate that a maintenance organisation cannot carry out work or certify inspections without their instructions or agreement and it follows that they should be specific when making known their work requirements to the organisation of their choice. Difficulties regularly occur because there is a misunderstanding between customer and maintenance organisation as to the former’s requirements.

7.2.5 The operator shall ensure that all tasks completed and certificated during line maintenance or by other organisations/engineers be made available to his maintenance contractor.

7.3 Contracting out Line Maintenance Support

7.3.1 Line maintenance is defined as those maintenance activities required to prepare an aircraft for flight including:

(a) Pre-flight inspections and servicing.

(b) Daily inspections.

(c) Minor scheduled maintenance.

(d) Defect rectification.

7.3.2 A written agreement shall exist between the operator or his principal contracted maintenance organisation and the organisation contracted for the performance of line maintenance, detailing the tasks to be performed on behalf of the operator. The arrangements shall be defined in company instructions so that responsibilities procedures and communication paths are made clear to all concerned.

7.3.3 The authorisation of maintenance personnel employed by the line maintenance contractor shall conform to any requirements and limitations imposed by the conditions of the approval granted by the Authority.

7.3.4 It is the responsibility of the operator to ensure that the continuing performance of the line maintenance contractor is such as to ensure safe operation of the operator's aircraft.

7.3.5 The operator or his principal contracted maintenance organisation may sub-contract a maintenance organisation to perform line maintenance activities outside Singapore under the provision of SAR-145.1(i). Under such arrangements, the operator shall be responsible for the sub-contractor's performance and the timely completion of the SAR-145 application.

7.4 Contracting out Ground Handling

7.4.1 The operator may enter into Ground Handling Agreements with other organisations for the provision of services associated with aircraft arrival, turnaround and dispatch. In these cases a written agreement shall exist detailing the tasks to be performed on behalf of the operator.

7.4.2 The operator shall ensure that maintenance or flight crew personnel responsible for accepting the aircraft for flight are made aware of any matter which is not included in the agreement at that station.

7.4.3 The operator shall clearly define the responsibilities for typical matters such as:

(a) opening and securing of aircraft hold doors: securing and locking when loading is complete;

(b) draining of water from aircraft fuel tanks;

(c) maintaining communication between flight deck and ground personnel.

7.4.4 This list is not exhaustive and may vary from operator to operator and station to station. Company instructions to flight crew and maintenance personnel shall identify responsibilities in each case.

7.4.5 It is the responsibility of the operator or his principal maintenance contractor to ensure that the continuing performance of the ground handling contractor is such as to ensure safe operation of the operator's aircraft, and that necessary initial and recurrent training has been performed.

7.5 Contracting out Engine Maintenance

7.5.1 When an operator chooses to contract-out maintenance of engines independently from the overall arrangements existing for maintenance support of the aircraft, the operator shall ensure that the principal maintenance contractor:

(a) is fully in agreement with the proposed arrangements;

(b) is kept continuously aware of engine condition monitoring and any adverse trends in reliability or performance which arise, if he is not directly a party to such monitoring;

(c) is made aware of the status of engines fitted to aircraft in respect of modifications, service bulletins and airworthiness directives;

(d) liaises with the engine maintenance contractor in respect of the requirements of the approved maintenance schedule for the aircraft so that the engine maintenance reflects the needs of the aircraft for airworthiness.

7.5.2 The operator shall ensure that at all times the liaison between the aircraft and engine maintenance organisations must be such as to enable the appropriately approved person to carry out maintenance reviews and issue the required certificate (CMR) and safely discharge his statutory responsibilities when doing so.

8 AIRWORTHINESS CONTROL PROCEDURES

8.1 General

8.1.1 Procedures described in company manuals and/or required to be provided by this publication shall be published in company documents and made available to staff concerned to ensure that they are aware of the procedures and their own resultant duties and responsibilities.

8.2 Maintenance Schedules - Control and Development

8.2.1 Pursuant to paragraph 9 of the ANO, an aircraft shall be maintained in accordance with an approved maintenance schedule.

8.2.2 AOC holders operating foreign-registered aircraft shall provide, for use and guidance of maintenance and operational personnel concerned, a maintenance schedule, approved by the State of Registry, containing the information required by Part I Chapter 11 (Manuals, Logs and Records) of Annex 6 (Operation of Aircraft) to the Convention on International Civil Aviation. The requirements of the maintenance schedule shall be no less stringent than those for the Singapore-registered aircraft. The operator shall ensure that the maintenance of its aircraft is performed in accordance with the approved maintenance schedule. The operator shall furnish the Authority with a copy of the approved maintenance schedule together with proof of its approval by the State of Registry when applying to include / use a foreign-registered aircraft in his operation.

8.2.3 The operator shall provide, for the use and guidance of maintenance and operational personnel concerned, a maintenance schedule containing the information required by the Singapore Airworthiness Requirements Section 4, Chapter 4.3. The design and application of the maintenance schedule shall observe human factors principles. The operator shall also ensure that the maintenance of its aeroplanes is performed in accordance with the approved maintenance schedule.

8.2.4 Two copies of the proposed maintenance schedule must be prepared and submitted for approval to the Authority. When the schedule is approved the applicant will be formally notified by means of a maintenance schedule Approval Document, which also defines the frequency and conditions for issue of Certificates of Maintenance Review and Release to Service for Scheduled Maintenance Inspection (SMI).

8.2.5 The operator shall ensure that the approved maintenance schedule is reviewed periodically to ensure that the detailed schedule requirements continue to have practical applicability in the light of experience and adequately meet the maintenance needs of the aircraft if continuing airworthiness in the respective operating circumstances is to be ensured.

8.2.6 Reviews shall take account of variations from the original certification standard of the aircraft which may have occurred as a result of modifications and respond to the recommendations of the manufacturer contained in maintenance manuals and Service Bulletins.

8.2.7 Changes in the use of aircraft may affect the conditions for approval of the maintenance schedule, for example with respect to annual utilisation, average flight duration and operating environment. Amendments to schedules and to engine maintenance programmes shall be submitted for approval in response to significant changes.

8.2.8 A continuous analysis shall be undertaken of defects arising on the aircraft during flight and at maintenance inputs, from technical logs and from worksheets raised during Scheduled Maintenance Inspections, particularly those where major structural inspections are undertaken. Results of the analysis shall be used to amend the maintenance schedule as appropriate to eliminate repetitive defects and trends.

8.2.9 Maintenance schedule reviews shall take account of the age and utilisation of the aircraft and the continuity of corrosion control programmes. More frequent maintenance may be required as aircraft grow older.

8.2.10 Copies of all approved amendments to the maintenance schedules shall be furnished promptly to the Authority and all organisations or persons to whom the maintenance schedules are issued.

8.3 Certificate of Maintenance Review (CMR)

8.3.1 The CMR signatory is required, before issuing the Certificate to ensure that all maintenance is complete, all mandatory inspections and modifications that are due have been complied with, all defects have been rectified or deferred in accordance with company procedures and that all necessary Certificates of Release to Service have been issued.

8.3.2 The Authority shall have access in respect of the aircraft being certified, to the approved maintenance schedule and check control system, the mandatory inspection/modification control system, the defect control system, all technical records including worksheets, and to aircraft defects. In the case of computer controlled record access must likewise be provided.

8.3.3 Quality Control audit records must be available to the CMR signatory on request relative to the aircraft being cleared such that he may discharge his responsibilities under the ANO.

8.4 Defects and Occurrences

8.4.1 An assessment of both the cause and any potentially hazardous effect of defects or combination of defects, and occurrences must be made in order to initiate any necessary further investigation and analysis.

8.4.2 A system of assessment e.g. through reliability programme, should be in operation to support the continuing airworthiness of aircraft and to provide a continuous analysis of the effectiveness of the operator's control systems in use.

8.4.3 The system should provide for the following:

(a) **Significant Incidents and Defects**. The monitoring on a continuous basis of incidents and defects that have occurred in flight and of defects found during maintenance and overhaul, highlighting any that appear significant in their own right.

(b) **Repetitive Incidents and Defects**. The monitoring on a continuous basis of defects occurring in flight and found during maintenance and overhaul, highlighting any that are repetitive.

(c) **Deferred and Carried Forward Defects**. The monitoring on a continuous basis of deferred and carried forward defects.

(d) **Unscheduled Removals and System Performance**. The analysis of unscheduled component removals and of the performance of aircraft systems; and its use as part of a maintenance programme.

8.5 Occurrence Reporting to the Design Organisation

8.5.1 The operator shall within 72 hours of the occurrence of a fault, malfunction, defect or other occurrences that cause or might cause adverse effect on the continuing airworthiness of the aircraft, submit a written report with information on the occurrence to the organisation responsible for the type design of that aircraft.

8.5.2 Where the information referred to in paragraph 8.5.1 relates to an engine or propeller, the operator shall transmit such information to:-

(a) the organisation responsible for the type design of the engine or the propeller, as the case may be; and

(b) the organisation responsible for the aircraft type design.

8.5.3 Where the occurrence referred to in paragraph 8.5.1 is associated with a modification, the operator shall, within 72 hours of the occurrence, submit a written report containing the information to the organisation responsible for the design of the modification.

8.6 Mandatory Occurrence Reporting to the Authority

8.6.1 The operator is responsible for Mandatory Reporting to the Authority. Details of the requirements for mandatory reporting of occurrences detected during maintenance or other work on an aircraft is in Chapter 4.9 of the Singapore Airworthiness Requirements.

8.6.2 The operator shall establish procedures to discharge these responsibilities and personnel shall be instructed as to their use.

8.6.3 Mandatory Occurrence Reports shall be made to the Authority through the person authorised under paragraph 8.8.1 of this Chapter.

8.6.4 The operator shall remain responsible for Mandatory Occurrence Reporting even when maintenance is contracted out, both to a local or foreign maintenance organisation.

8.7 Other Occurrence Reporting to the Authority

8.7.1 The operator shall ensure that such other reporting requirements as are prescribed from time to time are met.

8.8 Coordinating of Occurrence Reporting

8.8.1 Responsibility for co-ordinating action on airworthiness occurrences and for initiating any necessary further investigation and follow-up activity shall be assigned to a suitably qualified senior person with clearly defined authority and status.

8.8.2 Operational and maintenance reporting may be coordinated by one individual as long as the necessary integration is provided by the organisation.

8.8.3 A suitably qualified engineer within the organisation shall be assigned responsibility for co-ordinating with the operator's flight operational staff in connection with occurrences which have both airworthiness and operational implications.

8.8.4 This is particularly necessary where the operator contracts out his maintenance, when it must be clearly shown who performs this task in both the Operations Manual and the Engineering Exposition Document.

8.9 Deferred and Carried Forward Defects

8.9.1 The systems for controlling deferred and carried forward defects must be described in the Engineering Exposition Document. When transferring a defect in the Technical Log to the deferred sheets or carrying forward a defect during a maintenance check, the conditions approved by the Authority for the control of deferred defects must be complied with.

Note: (1) Deferred defects are defined as those defects reported in operational service which are deferred for later rectification.

(2) Carried forward defects are defined as those defects arising during maintenance which are carried forward for rectification at a later maintenance input.

8.9.2 There shall be a system to consider the cumulative effect of a number of deferred or carried forward defects occurring on the same aircraft. Any restrictions contained in the Minimum Equipment List must be considered. Deferred defects shall be made known to the flight crew.

8.9.3 There shall be a procedure to ensure that the period for which defects are deferred or carried forward reflects the importance of the defect as it affects airworthiness and/or safe operation. Limitation periods to be applied shall be identified in the Engineering Exposition Document (e.g. flight hours, calendar time, number of sectors, return to base). The control system shall ensure that the number of deferred defects and the length of time during which each defect is deferred are kept to a minimum.

8.9.4 There shall be a procedure to ensure that deferred defects are transferred to worksheets at maintenance periods, and to ensure that deferred defects which have not been actioned during maintenance periods, are re-entered on to a new deferred defect record sheet. The original date of the defect must be retained.

8.9.5 There shall be a procedure to ensure that the necessary components or parts are made available or ordered on a priority basis, and that they are fitted at the earliest opportunity.

8.9.6 There shall be a cross reference in the Technical Log to enable each defect which has been deferred to be traced back to its original entry.

8.10 Repetitive Defects

8.10.1 There shall be a system to control and monitor repetitive defects on a continuous basis appropriate to the number of aircraft operated and the nature of the operation. The system shall ensure that the history of a particular repetitive defect is not lost at scheduled inspections. A limit to the number of times a particular defect may be repeated shall be established, after which it shall be brought to the attention of a senior person in the Organisation, usually the Quality Manager. This person is responsible for ensuring that positive action is taken to obviate a further repetition of the defect.

8.10.2 Defects shall be recorded in a standardised way to assist in identifying which problems are repetitive. The operator shall ensure that line and outstation maintenance personnel have access to repetitive defect information.

8.11 Instructions to Maintenance Personnel

8.11.1 In addition to the technical and procedural contents of documents such as maintenance manuals and the Engineering Exposition Document prepared by the operator, there is a need for a system of bulletins or instructions with which to advise maintenance personnel of matters of immediate technical importance, and to define company practices where these differ from other published information.

8.11.2 The operator shall ensure that there is a system for publishing instructions which shall be:

(a) Distributed individually to maintenance personnel or in such a way that each person has access to a copy and there is a record kept to show that he has seen each document issued.

(b) Numbered sequentially and dated. Where instructions are revised an issue or revision number must be shown.

(c) Identified as to content, e.g. by ATA Chapter or by aircraft type number so as to permit easy access to particular subjects.

8.11.3 The principal source of matters to be addressed by the issue of instructions is expected to be the in-service experience of the aircraft being operated and maintained, to which the maintenance organisation finds a need to respond with guidance to maintenance personnel. Other sources of information include CAAS Airworthiness Notices, in-service experience reports and similar continuing airworthiness information published by airworthiness authorities and manufacturers.

8.11.4 Where instructions are issued which conflict with, or vary, information published by manufacturers or other sources it must be clearly shown which information takes priority. It must also be ensured that instructions cannot be construed as overriding published mandatory information or concern matters beyond the scope of the approval held by the organisation.

8.12 Technical Records

8.12.1 There shall be a department responsible for the compilation and co-ordination of technical records. It shall maintain a data recording system:

(a) Such that it is possible to ensure that the hours of service or elapsed times quoted in the approved maintenance schedule are not exceeded as regards components and structural assemblies, and that scheduled maintenance periods are adhered to.

(b) To record the number of landings, flights or cycles, and the use of maximum contingency or intermediate contingency power, when this information is specified in the approved Maintenance Schedule or manufacturer's manuals as a basis for inspection or other necessary action.

(c) To process the foregoing information into aircraft, engine and propeller log books or equivalent records, to maintain the records and documents concerning overhaul and repair work, component changes, mandatory modifications and inspections and to maintain the Modification Record Book.

(d) To maintain records required by the Singapore Airworthiness Requirements Section 4, Chapter 4.6.

8.12.2 A computer may be used as part of a technical records system with the agreement of the Authority. In this case procedures should be instituted which will ensure that the computerised record will provide security, storage, preservation and retrieval to the same level as would have been achieved by hard copy records. The Authority's acceptance of computerised recording does not exempt the operator or his contracted maintenance organisation from complying with the appropriate provisions of the ANO for the keeping and retention of records.

8.12.3 Records shall be structured or stored in such a way as to facilitate auditing.

8.13 Documentation for Maintenance Checks

8.13.1 The department responsible for technical records shall also be responsible for the accuracy of the documents issued for a maintenance check and shall maintain a procedure to ensure that only documents incorporating the latest amendments are issued, and that all superseded documents are withdrawn and cancelled. Working documents made available for use by maintenance staff such as worksheets or cards shall include:

(a) A list of inspections, checks or work items required to meet the requirements of the approved maintenance schedule and adequate directions for their implementation.

(b) The part numbers and serial numbers (unless not relevant to component control) of all components to be removed and replaced, and their locations on the aircraft.

(c) Details of any modifications which have to be incorporated during the check.

(d) Any mandatory or special inspections, or any other checks which are required to be made by the company in addition to those required by the approved maintenance schedule.

(e) Detailed procedures for engine runs, engine or propeller change, fuel flow tests, duplicate inspection of controls, landing gear retraction tests etc., as applicable.

(f) A list of outstanding deferred and carried forward defects.

8.13.2 Additional worksheets or cards shall be provided for recording the work completed as a result of the maintenance check and any defects arising from inspections.

8.13.3 All worksheets or cards shall be readily identifiable and shall bear an issue number. They shall also be identified to associate them positively with the relevant items in the maintenance schedule. The procedures for documentation control shall ensure that if any worksheet or card is mislaid or lost this will be readily apparent on completion of the check, and that each 'pack' of worksheets or cards is complete and certified before the aircraft is released for service.

8.13.4 Before issue, all worksheets or cards must be recorded on a 'workpack control' sheet which shall also state the following:

(a) Name and CAAS Approval reference of the maintenance organisation.

(b) Aircraft type and registration marks.

(c) The maintenance check to be carried out.

(d) The date.

(e) The approved maintenance schedule reference number and amendment state.

(f) The name of the operator.

8.13.5 Technical records are deemed to be essential records and may not be destroyed without permission from the Authority.

8.13.6 The compilation of maintenance check documentation may, alternatively, be allocated to a maintenance planning department, subject to the agreement of the Authority. In such cases the company Engineering Exposition Document must contain details not only of the procedures of the planning department through which the documentation is compiled but also of the monitoring programme exercised by Quality Assurance.

8.14 Airworthiness Directives and Manufacturers Technical Information

8.14.1 The operator shall have procedures and the necessary personnel to ensure that Airworthiness Directives are complied with as required. It must be clear, when maintenance is in any way subcontracted, that responsibility for compliance with mandatory airworthiness information such as Airworthiness Directives lies with the operator.

8.14.2 When assessing the overall capability of the operator provide satisfactory maintenance the following shall be taken into account:

(a) The assessment of incoming technical information from manufacturers, including Service Bulletins, relating to relevant aircraft types.

(b) Initiating action as necessary on such information, particularly in relation to the Maintenance Schedule.

(c) Responding to requests by the Manufacturer and the Authority, to have 'in-service' experience reports transmitted for their evaluation.

Note: The Authority may require access to an operator's assessments of manufacturer's service information to assist in evaluation of such information for the purpose of possible mandatory classification.

8.14.3 The operator shall obtain and assess airworthiness information from the manufacturer. When manufacturer's service information is received an immediate assessment must be made to establish priority of response. Matters of significant airworthiness importance, such as those having an impact on EDTO flights, must be responded to promptly.

8.14.4 By means of Modification Records, Technical Records, Log Books or other means adopted by the operator it must be possible at any time to establish the record of compliance with Directives and Service Information for each of the operator's aircraft.

8.14.5 Operators shall ensure that the relevant aircraft manufacturer is aware that they are users of his aircraft so that all relevant service information, details of in-service experience of the aircraft and amendments to manuals, including the Flight Manual, are received and embodied in a timely manner. This is especially important where the operator is not the original owner of the aircraft, or it has been leased from the owner.

8.14.6 Where manuals, including the Flight Manual, have been prepared or amended by an agency other than the manufacturer, the operator must ensure that amendments are prepared as necessary, submitted to the Authority for approval and incorporated into manuals promptly.

8.14.7 The technical library must hold and make available to personnel concerned the necessary technical data, e.g. CAAS publications, the ANO, manufacturer's manuals, any relevant service information, any other related literature appropriate to the aircraft types covered by the AOC and copies of appropriate company manuals, procedures and Instructions. A person must be appointed to be responsible for the technical library.

8.14.8 Arrangements shall be made for:

(a) The supply of amendments, so that all publications are kept up-to-date, and for departments concerned to be notified of such amendments, and of any additional technical information relevant to the work undertaken.

(b) Maintenance manual information recorded on microfilm, microfiche or disk to be checked at specific intervals for amendment state and legibility, and any temporary amendments to be kept available adjacent to each reader.

8.14.9 Arrangements shall be made for all technical drawings to be suitably stored and a procedure operated to ensure that only drawings of the correct issue are released. A person should be made responsible for maintaining an up-to-date record of drawings available and also for notifying departments concerned when drawings have been superseded by a later issue.

8.14.10 The technical library shall make arrangements for manuals or sections of manuals, schedules, service information, etc., appropriate to the work undertaken, to be made available to line maintenance stations and a suitable procedure maintained to ensure that such information is kept up to date.

8.14.11 Microfilm, microfiche and compact disk viewing and printing equipment must be available, as appropriate, at each location where manuals in these formats are in use, and in the library. Adequate arrangements must be made for regular maintenance of the equipment and users should be made aware of contact points for servicing and repair.

8.15 Spares

8.15.1 Provision and Storage. The operator shall provide for sufficient spares to be available to ensure that aircraft, engine and equipment defects can be promptly rectified. Spares may be provided by either the Operator or the maintenance organisation, as contractually agreed, but must as far as possible be located where they will be required to be used.

8.15.2 Account must be taken of the operator's Minimum Equipment Lists (MEL) to ensure that essential spares to support the rectification of defects in systems required for operation are placed where they are most likely to be needed and in such numbers as to ensure that successive defects will be promptly addressed.

8.15.3 The Authority may examine spares provisioning arrangements and any agreements entered into to ensure that adequate support for defect rectification is being made. Where necessary the Authority may require additional provisions to be made.

8.15.4 Spares provisions at each maintenance location should be determined when the particular base or station is commissioned and published in the company instructions/procedures defining the maintenance operations undertaken at the particular location.

8.15.5 Spares holdings should be reviewed at regular intervals at all locations to ensure that:

(a) Redundant items are removed, e.g. for aircraft no longer operated.

(b) Superseded parts, or those with out of date modifications states, are removed for replacement or up-dating.

(c) Previously assessed numbers of spares remain adequate for support in relation to routes, frequency of flights and numbers of aircraft.

(d) Airworthiness Directives and other mandatory requirements published while parts are in storage are complied with before the part is released for service.

8.15.6 Storage Procedures. All spares must be stored, at all times and locations, in such a manner as to ensure that they remain airworthy and fit for use when required. Parts must be used in rotation so that they remain in stores for as short a time as possible, i.e. first in - first out. The following are required.

(a) Procedures must be established to control the return to stores of items withdrawn for use but not needed, especially where the item has been installed in the aircraft and subsequently removed. The removal of components from completed assemblies must be rigidly controlled and any removal positively identified.

(b) Spares having a limited allowable shelf life, including materials and consumable products, must be identified and controlled.

(c) Stores references or batch numbers should be recorded on worksheets, cards or technical log pages so as to facilitate subsequent tracing of the associated part to source.

(d) Management procedures and conditions of storage must be reviewed regularly to ensure that satisfactory standards are being implemented.

8.16 Instructions to Flight Crews

8.16.1 Operators shall include written instructions in the Operations Manual so that:

(a) Pilots-in-command are advised of the action to be taken to obtain engineering assistance when aircraft are away from main base, of the procedures which are acceptable for any necessary certifications, and of the procedure to be adopted where any doubt exists over work being carried out by any other organisation, or which cannot be certified.

(b) Where no arrangements have been made in respect of engineering support at route stations, pilots-in-command are advised of the procedures to be followed for reporting defects to main base.

(c) Where it is desired to transmit advisory information of a temporary nature to flight crews, e.g. in respect of modifications to the aircraft, trial installations or other changes which the crew need to be aware of during their operation of the aircraft, or which impose operating restrictions, an information sheet should be included in the technical log containing the relevant data.

8.17 Aircraft Re-fuelling - Quality Assurance

8.17.1 The operator must be satisfied with the quality of all fuel taken on board his aircraft, particularly in respect of freedom from water contamination.

8.17.2 The operator must comply with the provisions of the ANO on Aviation Fuel at Aerodromes if he has a facility or vehicle in which fuel is stored and/or delivered to aircraft, as the ANO provisions apply to all fuel suppliers in Singapore to ensure that fuel dispensed is fit for use in aircraft.

8.17.3 The operator is required to:

(a) Keep a record of the fuelling arrangements at each station where fuel is uplifted, indicating the company or person responsible for monitoring the fuel supplier. This may be a nominated airline at each location, or the operator may, himself, choose to monitor the supplier’s quality performance.

(b) Institute a fuel uplift sampling programme taking into account matters such as the following

(i) Known supplier quality performance, including any history of contamination.

(ii) Local environmental conditions, e.g. likely sources of contamination including microbiological contamination.

(iii) Supply facilities.

(iv) Frequency of use.

(c) Provide flight crew with guidance on the accomplishment of fuel uplift sample checks and clear instructions as to when these are to be carried out.

(d) Provide maintenance personnel with guidance, in respect of fuel quality sampling, in relation to their station. Ensure that persons engaged in refuelling activities are properly trained for their tasks.

(e) Audit the arrangements as defined to ensure the continuing acceptability of fuel quality throughout the operation.

8.17.4 The minimum frequency of fuel contamination checking, at the point of uplift, must be declared in guidance to maintenance personnel and acceptable to the Authority.

8.17.5 The control of fuel storage and dispensing by suppliers should conform to the standards recommended in Singapore Airworthiness Guide SAG001 – "Aviation Fuel at Aerodromes."

8.18 Special Operations - Maintenance Requirements

8.18.1 <u>All Weather Operations</u>

8.18.1.1 The operator or his maintenance organisation must publish guidance to maintenance personnel and flight crews on the control of the validity of all weather categorisation. This guidance should take the form of:

(a) A list of the systems required to be fully serviceable in order to qualify the aircraft for Category II or III operations.

(b) A company procedure for the control of the modification status of the equipment fitted in the required systems which are deemed to be 'sensitive' in terms of all weather operations.

(c) Placards applied to both equipment and installation to alert maintenance personnel to the need to fit only controlled equipment.

(d) Procedures for downgrading all weather capability from Category III or II to Category I in the event that an uncontrolled item of equipment is fitted or after any defect in an affected system or any event which results in disturbance of the system.

(e) Procedures for up-grading capability from Category I to Category II or III as appropriate when serviceability is proven, normally by performing a successful Category II approach or Category III landing in Category 1 weather conditions (sometimes referred to as a standard landing).

8.18.1.2 Provision shall be made to inform the crew of the Category II or III status of the aircraft before the flight is begun.

8.18.1.3 When setting alert levels in system reliability monitoring, consideration must be given to the levels of reliability assumed in qualifying the aircraft for Category 2 or 3 operations. Significant trends must be responded to promptly or all weather classification must be suspended until remedial action has been taken.

8.18.2 <u>Extended Diversion Time (EDTO)</u>

8.18.2.1 RESERVED

8.18.2.2 The operator requesting for an EDTO operational approval shall prepare and implement a maintenance programme and procedures in accordance with the requirements in Section 4 Chapter 4.11 of the Singapore Airworthiness Requirements.

8.18.3 Reduced Vertical Separation Minima (RVSM)

8.18.3.1 The operator requesting RVSM operational approval shall submit and implement a maintenance and inspection programme as part of a continuing airworthiness maintenance programme approval pertaining to altimeter system and altitude reporting equipment test and inspections. An effective maintenance and inspection programme shall incorporate these provisions as a requirement for maintenance programme approval.

8.18.3.2 The integrity of the design features necessary to ensure that altimetry systems continue to meet RVSM standards should be verified by scheduled tests and inspections in conjunction with an approved maintenance program. The operator should review its maintenance procedures and address all aspects of continuing airworthiness which are affected by RVSM requirements.

8.18.3.3 Each operator should demonstrate that adequate maintenance facilities are available to ensure continued compliance with the RVSM maintenance requirements.

8.18.3.4 Each operator requesting RVSM operational approval should submit a maintenance and inspection program which includes any maintenance requirements defined in the approved data package as part of a continuous maintenance program approval.

8.18.3.5 The following maintenance documents should be reviewed as appropriate for RVSM maintenance approval :

(a) Maintenance Manual

(b) Structural Repair Manual

(c) Standards Practices Manual

(d) Illustrated Parts Catalogues

(e) Maintenance Schedule

(f) MMEL/MEL

8.18.3.6 If the operator is subject to an ongoing approved maintenance program, that program should contain the maintenance practices outlined in the applicable aircraft and component manufacturer’s maintenance manuals for each aircraft type. The following items should be reviewed for compliance for RVSM approval and if the operator is not subject to an approved maintenance program the following items should be followed :

(a) All RVSM equipment should be maintained in accordance with the component manufacturer’s maintenance requirements outlined in the approved data package.

(b) Any modification, repair, or design change which in any way alters the initial RVSM approval, should be subject to a design review by persons approved by the approving authority

(c) Any maintenance practices which may affect the continuing RVSM approval integrity, e.g. the alignment of pitot/static probes, dents, or the deformation around static plates, should be referred to the Authority.

(d) Built-in Test Equipment (BITE) testing is not an acceptable basis for calibrations, (unless it is shown to be acceptable by the airframe manufacturer with the approval of the Authority) and should only be used for fault isolation and troubleshooting purposes.

(e) Some aircraft manufacturers have determined that the removal and replacement of components utilising quick disconnects and associated fittings, when properly connected, will not require a leak check. While this approach may allow the aircraft to meet static system certification standards when properly connected, it does not always ensure the integrity of the fittings and connectors, nor does it confirm system integrity during component replacement and reconnections. Therefore a system leak check or visual inspection should be accomplished any time a quick disconnect static line is broken.

8.18.3.7 Airframe and static systems should be maintained in accordance with the airframe manufacturer's inspection standards and procedures.

8.18.4 <u>Minimum Navigation Performance Specifications (MNPS) and Required navigation Performance (RNP) Approval</u>

8.18.4.1 The operator requesting MNPS approval shall submit navigational equipment used, together with its installation and maintenance procedures.

8.18.4.2 Aircraft operating within MNPS Airspace are required to meet a Minimum Navigation Performance Specification (MNPS) in the horizontal plane through the mandatory carriage and use of a specified level of navigation equipment which has been approved by the Authority. Such approvals encompass all aspects affecting the expected navigation performance of the aircraft.

8.18.4.3 Approval for MNPS operations will require the checking by the Authority of various aspects affecting navigation performance. These aspects include the navigation equipment used, together with its installation and maintenance procedures, crew navigation procedures employed and training requirements.

8.18.4.4 Longitudinal separations between subsequent aircraft following the same track (in-trail) and between aircraft on intersecting tracks in the NAT MNPS Airspace are assessed in terms of differences in ATAs/ETAs at common waypoints. The longitudinal separation minima currently used in the NAT MNPS Airspace are thus expressed in clock minutes. The maintenance of in-trail separations is aided by the application of the Mach Number Technique. However, aircraft clock errors resulting in waypoint ATA report errors can lead to an erosion of actual longitudinal separations between an aircraft. It is thus vitally important that the time-keeping device intended to be used to indicate waypoint passing times is accurate, and is synchronised to an acceptable UTC time signal before commencing flight in MNPS Airspace. Thus the pre-flight procedures for any NAT MNPS operation must include a UTC time check and resynchronisation of the aircraft Master Clock.

8.18.4.5 There are two navigational requirements for aircraft planning to operate in MNPS Airspace. One refers to the navigation performance which should be achieved, in terms of accuracy. The second refers to the need to carry standby equipment with comparable performance characteristics. Thus in order to justify consideration for approval of unrestricted operation in the MNPS Airspace an aircraft must be equipped with the following :

(a) Two fully serviceable Long Range Navigation Systems (LRNSs). A LRNS may be one of the following :

- one Inertial Navigation System (INS);
- one Global Navigation Satellite System (GNSS); or
- one navigation system using the inputs from one or more Inertial Reference System (IRS) or any other sensor system complying with the MNPS requirement.

(b) each LRNS must be capable of providing to the flight crew a continuous indication of the aircraft position relative to desired track.

(c) it is highly desirable that the navigation system employed for the provision of steering guidance is capable of being coupled to the autopilot.

8.18.4.6 Operators requesting for operations approval where a navigation specification for PBN or an RCP or RSP specification for PBCS has been prescribed must be equipped with the appropriate equipment which will enable it to operate in accordance with the prescribed specification(s), and also have appropriate maintenance procedures to ensure continued airworthiness in accordance with the prescribed specification(s).

8.18.4.7 The Authority will grant the applicable navigation specification(s) approval when satisfied that the aircraft equipment together with the maintenance and operating procedures are sufficient to support such operations.

8.19 Preparation of Aircraft for Flight

8.19.1 The operator must ensure that the Operations Manual and Maintenance Schedule contain a pre-flight inspection to be completed by the crew or by maintenance personnel where available, with which to verify that the aircraft continues to be serviceable. Details of this inspection should also be included in the Technical Log.

8.19.2 The operator must provide information, preferably, in the Technical Log, to advise the Pilot-in-command when the next Scheduled Maintenance Inspection (SMI) is due, by flying hours and calendar time, any defects existing on the aircraft affecting its operational airworthiness and safety, and any maintenance actions falling due before the next SMI.

8.19.3 Where a procedure acceptable to the Authority exists for the control of maintenance actions necessary between Scheduled Maintenance Inspections it may not be practicable to include full details in the Technical log. In such cases, it should be possible for flight crew to verify, with the assistance of maintenance personnel if necessary, that no maintenance task is due or will become due before the end of the intended flight.

8.19.4 The operator must provide any other information to the crew concerning the aircraft and its systems, including changes resulting from modifications, which may affect the operation of the aircraft.

8.19.5 The operator must have management and quality assurance procedures which will ensure that whether the aircraft is dispatched by the Operator or the task is wholly or partly sub-contracted:

(a) Fuel uplifted prior to flight is free from contamination.

(b) Refuelling of the aircraft is carried out in a controlled manner taking into account essential safety measures for fire prevention.

(c) Baggage and cargo is loaded and restrained in accordance with Flight Manual limitations and that cargo doors are securely fastened.

(d) Push-back and start-up are carried out to a standard procedure for the specific type of aircraft, under the control of a suitably trained person, that the area in which engines will be started is free from debris and contamination likely to damage the engines and that fire-fighting facilities are immediately available.

(e) Control surface and landing gear locks, restraint devices and blanks are removed.

(f) Proper attention is given to the rectification of recorded defects, compliance with the MEL and any limitations imposed in respect of the period of flights, flying hours or calendar time.

(g) The aircraft is serviced and inspected as required by the approved maintenance schedule.

8.20 Cabin Reconfiguration - Approval and Control

8.20.1 Any change to the cabin configuration from that for which the aircraft was first certificated constitutes a modification which must be approved by the Authority.

8.20.2 Revised or alternative seating layouts, the fitting of stretchers or the conversion of the cabin to a cargo carrying role all constitute modifications which must conform to an approved design and be certified with the issue of a Certificate of Release to Service (CRS) each time they are installed or the original configuration is restored.

8.20.3 The Operations Manual and instructions to maintenance personnel must contain precise descriptions, preferably pictorial, of the approved configuration and any limitations to be observed. It is recommended that the various actions necessary are summarised in a checklist in each case, particularly in respect of the fitting or securing of emergency equipment and exits. Checklists should be readily available to personnel when carrying out configuration changes.

8.20.4 Where any possibility of error exists, such as in the position of seats and of fitting incorrect seats at and adjacent to emergency exits, the aircraft and the item to be fitted should be clearly marked and the pictorial diagram of the configuration should illustrate the arrangement.

8.20.5 Clear and easily interpreted guidance must be given to persons responsible for loading and securing the aircraft for flight so that the conditions of the approved modification are observed. In cases where the main cabin is used for the carriage of cargo it should be possible to readily install a configuration embodying methods of restraint which will ensure compliance with cabin design limitations without the need for extensive calculations at the point of dispatch.

8.20.6 It must be ensured that all cabin configurations are fully represented in aircraft prepared for service weights and indices used in the loading calculations made prior to flight dispatch.

8.20.7 Approved modifications for cargo configurations should contain the various restraint practices used by the operator to facilitate the satisfactory carriage of different types.

8.20.8 Operators must have a care and maintenance programme for cargo containers and pallets used either in cargo holds or the main cabin, particularly where the container itself is designed to provide necessary restraint and, in some cases, fire containment. Care and maintenance programmes must include details of permissible damage and any limitations, procedure for the assessment of containers and details of repair action to be taken.

8.20.9 Certificates of Release to Service (CRS) must be issued for each change of configuration. The CRS must refer to the modification being embodied or removed but may do so through reference to a company instruction or role diagram, etc which directly records compliance with the requirements of the modification.

8.21 Aircraft External Damage Marking

8.21.1 In the course of normal service aircraft may suffer external damage in the form of scratches and minor dents as a result of collision with cargo and baggage loading equipment, access steps and vehicles.

8.21.2 Operators shall have a system for identifying such damage after inspection and acceptance so that it is readily apparent when new damage occurs.

8.21.3 Damage should be entered in a record kept in the aircraft either directly on pictorial diagrams or by use of a grid referencing system: Such records may be included in the Technical Log or another readily available document.

8.21.4 When considered desirable as a means of prompt recognition of accepted damage it is acceptable for the actual damage to be marked using a suitable method of identification.

8.21.5 The damage record for each aircraft shall be reviewed by the operator from time to time to ensure that it has been kept up to date, that repaired damage is not removed from the aircraft record and that the cumulative effects of damage do not exceed manufacturers limitations.

8.22 Aircraft Furnishings

8.22.1 The operator must have adequate control over the cleaning of aircraft furnishing materials. For this, they need to have knowledge of the material type, the recommended cleaning or proprietary finishing processing methods, the effects of time in service on the flame resistance properties, the flame retardant processes applied, if any, and the method of re-application of such a process, where this is necessary.

8.22.2 Where materials, e.g. seat covers, require the application of a proprietary flame retardant process in order to satisfy airworthiness requirements it is strongly recommended that each item is identified with the number and type of cleaning actions it receives until it is re-proofed.

8.22.3 It is not acceptable to place reliance on unsubstantiated claims concerning the continuance of flame resistant properties of a material after durability or additional flame retarded processes have been applied. Where such processes have been applied, there are needs to prove the continued acceptability of a particular material or process in service, and, therefore, further flame resistance tests must be conducted in accordance with requirements identified in the Singapore Airworthiness Requirements.

8.23 Maintenance of Cabin and Other Safety Provisions

8.23.1 Provisions made for the safety of passengers in flight and in the event of emergency alighting may be subject to abuse by passengers either deliberately or by virtue of frequent use. It is therefore essential that regular inspections take place to ensure that the means by which the particular provision is implemented remain valid and any defined or implied inspection requirements are accomplished.

8.23.2 In some cases re-configuration of the cabin can result in seat positions, placards and emergency equipment being moved or omitted. Subjects which require frequent monitoring include the following matters:

(a) Stowage and accessibility of lifejackets.

(b) Continuing compliance, and test, of floor proximity escape path marking.

(c) Testing of cabin and toilet smoke detector systems.

(d) Access to and functioning of type III and IV exits.

(e) Integrity of cargo compartment fire containment capability, linings and seals.

(f) Inspection of catering carts and trolleys, brakes, restraints and placards.

(g) Functional test of inflatable escape chutes and flotation devices (aeroplanes and helicopters).

(h) Continuity integrity of toilet fire precautions.

(i) Protection of life rafts and flotation bags from damage after deployment.

(j) Compliance with approved cabin configuration for seat positions, access to exits and minimum space for seated passengers, particularly where seats are regularly removed and refitted.

(k) Statutory provisions for the marking of exits and break-in areas.

8.24 Technical Logs

8.24.1 Upon rectification of any defect which has been entered in the technical log there shall be Certificate of Release to Service issued readily identifiable with the defect entry to which it relates.

8.24.2 Copies of all technical log page format must be submitted to the Authority for acceptance.

9 MAINTENANCE FACILITIES

9.1 General

9.1.1 When the operator performs maintenance of his own aircraft, engines, propellers, appliances, emergency equipment items, and parts, he shall comply with the requirements of SAR-145 or in accordance with the Maintenance Control Manual, as the case may be.

9.1.2 The operator may contract engineering and maintenance functions to a separate organisation approved in accordance with the SAR-145. However, responsibility for the airworthiness of the operator's aircraft remains with the operator.

9.2 Line Maintenance Facilities

9.2.1 The numbers and qualifications of staff at line stations must be sufficient to perform the tasks allocated to the station. Shift arrangements must ensure that persons are available when needed and to ensure continuity of control over servicing and dispatch activities. Arrangements must be made to ensure that on-coming shifts are made fully aware of any outstanding or incomplete task.

9.2.2 Scheduled or pre-planned tasks must only be allocated to line stations where sufficient staff and down-time are available to perform the task, in a manner commensurate with its airworthiness significance, the working conditions are appropriate to the nature of the task and the necessary tools, equipment, test apparatus and technical instructions are available, and are calibrated as necessary.

9.2.3 Each line station must be provided with:

(a) A summary of the technical literature provided for the station. The list should be kept up to date and made available to the technical library so that amendments and periodic checks of currency can be made.

(b) A summary of the station spares holding with an indication of which items are held for priority purposes, e.g. to meet possible MEL compliance requirements or EDTO dispatches etc.

(c) Company procedures and technical instructions appropriate to the aircraft types supported.

(d) Such extracts from the maintenance schedule, in the form of worksheets or cards etc, as are necessary to perform the tasks allocated to the station.

(e) Access to deferred and repetitive defect information to assist in the diagnosis of reported defects.

(f) Details of any subcontracts for line support, fuel supply, loading and ground handling entered into by the Operator to enable the person responsible for dispatch to ensure that all significant airworthiness tasks are satisfactorily accomplished.

(g) Maintenance facilities and working accommodation appropriate to the scale of work and undertakings of the station.

(h) Ground support equipment as appropriate including equipment or access to equipment for the ground de-icing, anti-icing of aircraft as necessary.

9.3 Ground De-icing and Anti-icing

9.3.1 It must be ensured that de-icing equipment is checked immediately before the commencement of winter operations and at intervals throughout the winter season to verify that the equipment is fully serviceable at each location where aircraft are likely to require de-icing.

9.3.2 Items such as mixer nozzles must be correctly calibrated and it must be ensured that they are not replaced with incorrectly calibrated nozzles during the winter season.

9.3.3 Satisfactory procedures for testing mixtures of de-icing fluids must be established together with suitable conditions for the storage and identification of de-icing fluid.

9.3.4 Where facilities for common use are provided at airports or this task is contracted out to a specialist organisation such audit checks must be carried out by the operator as are necessary to ensure that de-icing/anti-icing of his type of aircraft will be carried out effectively and in a manner to ensure subsequent safe operation.

10 QUALITY CONTROL AND ASSURANCE

10.1 General

10.1.1 The operator’s systems for quality assurance must take into account all of the facilities and procedures utilised to ensure continuing airworthiness, at each of the operator’s locations where activities take place affecting the airworthiness of the aircraft.

10.1.2 Quality assurance must therefore be effective throughout the operation and maintenance of aircraft and quality auditing must ensure that control is being properly applied and achieving satisfactory results.

10.1.3 The operator's quality assurance policies and systems must be described in the Engineering Exposition Document together with the Quality Assurance audit programme.

10.1.4 The operator shall ensure that the quality department is adequately staffed by appropriately trained personnel (including recurrent training) to discharge his responsibilities.

10.2 Procedures

10.2.1 Staff assigned to quality assurance duties must be:

(a) sufficiently experienced in the company systems and procedures and technically knowledgeable of the aircraft being maintained so as to enable them to perform their duties satisfactorily;

(b) experienced in the techniques of quality control and assurance or receive suitable training before taking up their duties;

(c) given clearly defined terms of reference and responsibility within the organisation.

Note: This is particularly important where quality assurance personnel are also expected to perform other duties in the organisation, e.g. to issue CMR or other maintenance certification.

10.2.2 The department responsible for Quality Assurance must arrange for independent quality audit checks to be carried out on a planned basis. Emphasis should be placed on the company systems employed to achieve and ensure airworthiness, their suitability and effectiveness. The scope of quality checks should follow the guidelines given at Appendix H.

10.2.3 All quality checks must be recorded and assessed and any criticisms forwarded to the person responsible for the particular facility or procedure for corrective action to be taken. There must be a feed-back system for confirming to the quality assurance staff that corrective action has been taken and to ensure that persons concerned with any audit deficiency are kept aware of both the adverse report and the outcome.

10.2.4 The operator shall submit to the Authority regular reports on quality assurance overview including quality indicators.

11 REQUIREMENTS FOR THE MAINTENANCE OF APPROVAL

11.1 The operator shall continue to meet the standard necessary to undertake the work for which it is approved and all activities carried out under the approval granted shall be conducted to the satisfaction of the Authority.

11.2 The operator shall be responsible for compliance with the ANO, the Air Operator Certificate Requirements, the Singapore Airworthiness Requirements, associated procedures, and other requirements as may be prescribed by the Authority from time to time.

11.3 The operator shall consult the Authority if any difficulty arises in the interpretation of the ANO, the Air Operator Certificate Requirements, the Singapore Airworthiness Requirements, associated procedures, or on any airworthiness matter which involves new problems or techniques.

11.4 The Engineering Exposition Document required by paragraph 2.1 shall be reviewed periodically by the operator and any necessary amendments submitted in duplicate to the Authority for acceptance.

11.5 The operator shall report to the Authority in writing as soon as possible of any accident or incident occurring in the approved facility.

11.6 The operator shall permit access by Authorised Officers to any of its facilities and shall arrange similar access to foreign organisations undertaking work on its behalf for the purpose of:

(a) Assessing whether the operator and his maintenance contractors continue to comply with the conditions of its approval and whether the activities to which the approval relates are carried out to a satisfactory standard.

(b) Assessing whether a foreign organisation has adequate facilities, staff premises and equipment, the quality of work is satisfactory and co-ordination, planning and control of all work complies with these requirements.

(c) Assessing whether the policies and procedures stated in the Engineering Exposition Document are being observed.

(d) Inspection of aircraft, components, equipment or any work in progress to assess the competence or diligence of engineering staff.

(e) Witnessing tests or inspections in any way associated with establishing the airworthiness of an aircraft, engine or any part thereof.

(f) Investigation of components, equipment or materials which due to unserviceability, manufacturing discrepancies, inadequate control during manufacture, overhaul or processing, inadequate storage, deterioration or contamination have been found to be unsuitable for aircraft use.

(g) Investigation of defects in aircraft, components or equipment and accidents/incidents.

11.7 Where deficiencies or discrepancies have been disclosed to the operator or his maintenance contractor subject to a surveillance inspection, the operator shall ensure that corrective action is taken and advise the Authority of the action taken.

CHAPTER 9
ADDITIONAL REQUIREMENTS FOR HELICOPTERS

EFFECTIVE DATE : 11 JANUARY 2017
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1 PURPOSE

1.1 This Chapter contains additional requirements that operators and pilots-in-command engaged in helicopter operations for the purpose of public transport shall comply with to qualify for and maintain the operators' AOC.

1.2 Additional definitions and abbreviations are contained in Appendix S.

2 HELIPORT OPERATING MINIMA

2.1 General

2.1.1 An operator shall establish heliport operating minima for each heliport that is used by the operator for its operations. The method of determination of such minima shall be subject to the approval of the Authority. Such minima shall not be lower than any that may be established for such heliports by the State in which the heliport is located, except when specifically approved by that State.

Note. – Operations with lower visibilities than normally associated with the helicopter operating minima may only be allowed on a helicopter with HUV and/or EVS if approval has been obtained in accordance to paragraph 2.9.1.

2.1.2 In establishing the heliport operating minima for any operation, an operator shall take into account of:

(a) The type, performance and handling characteristics of the helicopter;

(b) The composition of the flight crew, their competence and experience;

(c) The dimensions and characteristics of the final approach and take-off areas (FATO) / runways which may be selected for use;

(d) The adequacy and performance of the available visual and non-visual ground aids;

(e) The equipment available on the helicopter for the purpose of navigation and/or control of the flight path during the take-off, the approach, the flare, the hover, the landing, the roll out and the missed approach;

(f) The obstacles in the approach and missed approach areas and the obstacle clearance altitude/height for the instrument approach procedures;

(g) The means used to determine and report meteorological conditions; and

(h) The obstacles in the climb-out areas and necessary clearance margins.

2.1A Heliport Operating Minima (Operations under IFR)

2.1A.1 An operator shall classify instrument approach operations based on the designed lowest operating minima below which an approach operation shall only be continued with the required visual reference as follows:

(a) Type A: a minimum descent height or decision height at or above 75 m(250ft); and

(b) Type B: a decision height below 75 m(250 ft). Type B instrument approach operations are categorised as:

(1) Category I (CAT I): a decision height not lower than 60 m (200 ft) and with either a visibility not less than 800 m or a runway visual range not less than 550 m;

(2) Category II (CAT II): a decision height lower than 60 m (200 ft), but not lower than 30 m(100 ft) and a runway visual range not less than 300 m;

(3) Category IIIA (CAT IIIA): a decision height lower than 30 m (100 ft) or no decision height and a runway visual range not less than 175 m;

(4) Category IIIB (CAT IIIB): a decision height lower than 15 m (50 ft), or no decision height and a runway visual range less than 175 m but not less than 50 m; and

(5) Category IIIC (CAT IIIC): no decision height and no runway visual range limitations.

Note 1. - Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach operation would be conducted in accordance with the requirements of the most demanding category (e.g. an operation with a DH in the range of CAT IIIA but with an RVR in the range of CAT IIIB would be considered a CAT IIIB operation or an operation with a DH in the range of CAT II but with an RVR in the range of CAT I would be considered a CAT II operation).

Note 2.- The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot-in-command to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In the case of a circling approach operation the required visual reference is the runway environment.

Note 3.- Guidance on approach classification as it relates to instrument approach operations, procedures, runways and navigation systems is contained in the All Weather Operations Manual (Doc 9365).

2.1A.2 An operator shall not authorised Category II and Category III instrument approach operations unless RVR information is provided.

2.1A.3 An operator shall determine the operating minima for 2D instrument approach operations using instrument approach procedures y establishing a minimum descent altitude (MDA) or minimum descent height (MDH), minimum visibility and, if necessary, cloud conditions.

Note. - For guidance on applying a continuous descent final approach (CDFA) flight technique on non-precision approach procedures refer to PANS-OPS (Doc. 8168), Volume I, Section 1.7.

2.1A.4 An operator shall determine the operating minima for 3D instrument approach operations using instrument approach procedures by establishing a decision altitude (DA) or decision height (DH) and the minimum visibility or RVR.

2.2 Take-off Minima

2.2.1 The operator shall establish take-off minima and the relevant visibility or runway visual range (RVR) limits, taking into account all relevant factors for each heliport planned to be used and the helicopter characteristics. Where there is a need to see and avoid obstacles on departure and/or a forced landing, additional conditions (e.g. ceiling) must be specified.

2.2.2 The pilot-in-command shall not commence take-off unless the weather conditions at the heliport of departure are equal to or better than applicable minima for landing at that heliport unless a suitable take-off alternate heliport is available.

2.2.3 When the reported meteorological visibility is below that required to take-off and the RVR is not reported, a take-off may only be commenced if the pilot-in-command can determine that the RVR and visibility along the take-off FATO and runway is equal to or better than the required minima.

2.2.4 When no reported meteorological visibility or RVR is available, a take-off may only be commenced if the pilot-in-command can determine that the RVR and visibility along the take-off FATO and runway is equal to or better than the required minima.

2.2.5 The take-off minima must be selected to ensure sufficient guidance to control the helicopter in the event of both a discontinued take-off in adverse circumstances and a continued take-off after failure of a critical power-unit.

2.2.6 An operator shall not conduct night operations without ground lighting to illuminate the FATO, runway and any obstacle unless otherwise agreed by the Authority.

2.3 Required RVR/Visibility

2.3.1 For operations in performance Class 1, an operator shall establish an RVR and visibility respectively (RVR/VIS) as take-off minima in accordance with Table 1 in Appendix T.

2.3.2 For operations in performance Class 2, the take-off minima shall be 1000 m RVR/Vis and a cloud ceiling of 500 ft. In addition, the operator shall instruct pilots-in-command to remain clear of cloud during the take-off manoeuvre until reaching Performance Class 1 capabilities.

2.4 2D Instrument Approach Operations

2.4.1 An operator shall ensure that system minima for 2D instrument approach operation, are not lower than the minimum descent height (MDH) values given in Table 2 in Appendix T.

2.4.2 An operator shall ensure that the minimum descent height for a 2D instrument approach operation is not lower than either:

(a) the Obstacle Clearance Height/ Limit (OCH/OCL) for the category of helicopter; or

(b) the system minimum.

2.4.3 A pilot may not continue an approach below minimum descent altitude (MDA)/minimum descent height (MDH) unless at least one of the following visual references for the intended FATO/runway is distinctly visible and identifiable to the pilot:

(a) Elements of approach light system;

(b) The threshold;

(c) The threshold markings;

(d) The threshold lights;

(e) The threshold identification lights;

(f) The visual glide slope indicator;

(g) The touchdown zone or touchdown zone markings;

(h) The touchdown zone lights;

(i) FATO/Runway edge lights; or

(j) Other visual references accepted by the Authority.

2.4.4 For 2D instrument approaches operation by helicopters operating in Performance Class 1, the required RVR minima given in Table 3 in Appendix T shall apply.

2.4.5 When the missed approach point is within 0.5 NM of the landing threshold, the approach minima given for full facilities may be used regardless of the length of approach lighting available. However FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required.

2.5 3D Instrument Approach – Category I Operations

2.5.1 A Category I operation is a 3D instrument approach operation using ILS, Microwave Landing System (MLS), Performance-Based Navigation (PBN), GLS (GNSS Landing System) or Satellite-Based Augmentation System (SBAS) Category I with a decision height not lower than 200 ft and with a runway visual range not less than 500 m.

2.5.2 An operator must ensure that the decision height to be used for a Category I 3D instrument approach operation is not lower than:

(a) the minimum decision height specified in the helicopter flight manual if stated;

(b) the minimum height to which the 3D instrument approach operation aid can be used without the required visual reference; or

(c) the OCH/OCL for the category of helicopter or 200 ft.

2.5.3 A pilot may not continue the approach below the Category I decision height, determined in accordance with sub-paragraph 2.5.2 above, unless one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(a) Elements of approach light system;

(b) The threshold;

(c) The threshold markings;

(d) The threshold lights;

(e) The threshold identification lights;

(f) The visual glide slope indicator;

(g) The touchdown zone or touchdown markings;

(h) The touchdown zone lights; or

(i) FATO/runway edge lights.

2.5.4 For Category I operations in Performance Class 1 helicopters the minima contain in Table 4 in Appendix T shall apply.

2.5.5 For night operations ground lighting must be available to illuminate the FATO/runway and any obstacles unless otherwise agreed by the Authority.

2.6 Visual Flight Rules Operating Minima

2.6.1 An operator shall ensure that:

(a) flights conducted in accordance with Visual Flight Rules (VFR) are in accordance with the minimum visibilities for VFR operations stated in Table 5 in Appendix T;

(b) helicopters are operated in flight visibility of not less than 1500 m during daylight and not less than 5 km by night. Low level overwater flights out of sight of land are only to be conducted under VFR when the cloud ceiling is greater than 600 ft by day and 1200 ft by night;

(c) Notwithstanding paragraph 2.6.1(b), in class G airspace, when flying between helidecks where the over water sector is less than 10 km, VFR flights shall be conducted in accordance to Table 6 in Appendix T; and

(d) Notwithstanding paragraph 2.6.1(b), flights operating under special VFR conditions comply with the zone minima in force.

2.7 Onshore Circling

2.7.1 The specified MDH for onshore circling shall not be less than 250 ft, and the meteorological visibility shall not be less than 800m.

Note: Visual manoeuvring (circling) with prescribed tracks is an accepted procedure within the meaning of this paragraph.

2.8 Airborne Radar Approach (ARA)

2.8.1 An operator shall not conduct an ARA unless authorised by the Authority.

2.8.2 The operator shall establish procedures for the conduct of ARAs. An ARA shall not be conducted unless:

(a) The radar can provide course guidance to the pilot-in-command to ensure obstacle clearance;

(b) The pilot-in-command can ensure a clear path exists on the radar screen for the final and missed approach segments before commencing the final approach. If lateral clearance from any obstacle is less than 1.0 NM, the pilot-in-command shall:

(i) Approach to a nearby target structure and thereafter proceed visually to the destination structure; or

(ii) Make the approach from another direction leading to a circling manoeuvre.

(c) The cloud ceiling above the helideck is sufficiently clear to permit a safe landing.

2.8.3 An ARA shall not continue beyond Decision Range or below MDH/MDA unless he is visual with the destination. The decision range shall not be less than 0.75 NM unless an operator has demonstrated to the Authority that a lesser Decision Range can be used at an acceptable level of safety.

2.8.4 Flights using ARAs are not permitted to rigs or vessels under way unless the flight crew consists of at least 2 pilots.

2.8.5 The operator shall establish the minimum descent height (MDH) using a radio altimeter. The MDH shall not be less than 50 ft above the elevation of the helideck and:

(a) For an ARA shall not be lower than:

(i) 200 ft by day; and

(ii) 300 ft by night

(b) For an approach leading to a circling manoeuvre shall not be lower than:

(i) 300 ft by day; and
(ii) 500 ft by night

2.8.6 An MDA shall only be used if the radio altimeter is unserviceable. The MDA shall be a minimum of the MDH plus 200 ft and shall be based on a calibrated barometer at the destination or the lowest forecast QNH for the region.

2.9 Helicopters equipped with automatic landing systems, HUD, EVS, SVS or CVS

2.9.1 Where a Singapore helicopter is equipped with automatic landing systems, HUD or equivalent displays, EVS, SVS or CVS, such systems shall not be used to gain operational benefits unless approved by the Authority.

Note. – Guidance on HUD and EVS is contained in relevant advisory circulars.

3 LOW VISIBILITY OPERATIONS

3.1 General

3.1.1 An operator shall not conduct any low visibility take-off unless otherwise approved by the Authority.

3.1.2 An operator shall not conduct Category II or III operations unless:

(a) The helicopter involved in the conduct of the operations is certified for operations with decision heights below 200 feet;

(b) The operator has established and maintains a system for recording the success rate for approach or automatic landing to monitor the overall safety of the operations;

(c) The helicopter is piloted by at least 2 pilots qualified for low visibility operations;

(d) Decision height is determined by means of a radio altimeter; and

(e) Runway visual range (RVR) is made available to the pilot-in-command.

3.1.3 An operator wishing to conduct low visibility take-off, Category II and III operations must establish relevant training requirements and operational procedures approved by the Authority for the conduct of such operations. The procedures shall be contained in the Operations Manual.

3.2 Heliport

3.2.1 An operator shall not use a heliport for Category II or III operations unless:

(a) the heliport is approved for such operations by the State in which the heliport is located; and

(b) the heliport has established low visibility procedures for the purpose of low visibility operations.

3.3 Responsibilities of Pilot-in-Command

3.3.1 The pilot-in-command shall not conduct low visibility take-off, Category II and III operations unless he is satisfied that:

(a) The status of the helicopter and the relevant airborne systems is appropriate for the specific operations to be conducted;

(b) the status of the visual and non-visual facilities is sufficient prior to commencing a low visibility take-off or a Category II or III approach;

(c) the appropriate low visibility operating procedures are in force according to information received from air traffic services before commencing a Low Visibility Take-off or a Category II or III approach; and

(d) the flight crew members conducting the low visibility take-off or a Category II or III operations are properly qualified to do so.

3.4 Minimum Equipment

3.4.1 An operator shall include in the Operations Manual the minimum equipment that has to be serviceable at the commencement of a low visibility take-off or a Category II or III approach in accordance to the Helicopter Flight Manual.

4 FUEL PLANNING AND MANAGEMENT

4.1 Fuel Planning

4.1.1 An operator shall not commence a flight unless, taking into account both the meteorological conditions and any delays that are expected in flight, the helicopter carries sufficient fuel and oil to ensure that it can safely complete the flight. In addition, fuel reserves shall be carried to provide for contingencies.

4.1.2 A minimum in-flight indicated fuel state shall be set down for each type of helicopter and operation, particularly for specialised activities, such as aerial crane work and winching operations.

4.1.3 Operators operating helicopters equipped for cross-feeding or balancing of fuel in flight shall ensure that cross-feeding or fuel balancing procedures are contained in the operations manual.

4.2 VFR Flights

4.2.1 For flights by day operated under VFR over non-hostile terrain (i.e. where a forced landing may be carried out with a high degree of confidence that there is not likely to be a consequential survival problem), the total fuel carried must be sufficient for at least:

(a) Start-up and taxi (this may be a standard fixed amount);

(b) The route from departure point to destination;

(c) Holding at destination for at least 20 minutes (at endurance speed); and

(d) Contingency purposes. Contingency reserve shall be 5% of fuel require for the route. Extra fuel may be carried at the discretion of the pilot-in-command.

4.2.2 Flights taken on a VFR fuel formula above may not carry out flight under IFR unless all the fuel requirements outlined in paragraph 4.3 are met when flight in IFR starts.

4.3 IFR Flights

4.3.1 For flights operated under IFR, offshore and over hostile terrain (i.e. where forced landings are not possible or which present a consequential survival problem.); the total fuel carried must be sufficient for at least:

(a) Start-up and taxi (this may be a standard fixed amount);

(b) The route from departure point to destination;

(c) One go-around;

(d) Re-route to an alternate, including diversion to a suitable alternate using a suitable altitude (at least the MSA), unless otherwise approved by the Authority. When no suitable alternate is available (e.g. the destination is isolated), sufficient fuel shall be carried to enable the helicopter to fly for a period that will, based on geographic and environmental considerations, enable a safe landing to be made;

(e) 30 minutes of holding at endurance speed at 450 m (1,500 ft) above the alternate under standard temperature conditions. Additional fuel may be required in areas where air traffic delays are likely to occur; and

(f) Contingency purposes. Contingency reserve shall be at least 10% of the total fuel required for Paragraphs 4.3.1 b), c) and d). Extra fuel may be carried at the discretion of the pilot-in-command.

4.3.2 Provided the sum total of reserve fuel carried is not less than that stated in paragraph 4.3.1e) and f), operators may define their own fuel formulae to be included in their operations manual.

4.3.3 For flights departing from offshore installations and vessels connected with the exploitation of oil, gas and mineral resources to certain land aerodromes, requirements pertaining to fuel for contingency purposes may be waived, subject to approval by the Authority, if at the fuel planning stage, the forecast and the latest information available to the pilot-in-command indicates that the cloud ceiling and visibility at destination will:

(a) By day, be at least 600 ft above the surface with 4 km visibility and no probability of temporary or intermittent deterioration.

(b) By night, 1200 ft above the surface with 5 km visibility and no probability of temporary or intermittent deterioration.

4.4 Safety Measures for Refuelling

4.4.1 A helicopter shall not be refuelled when passengers are embarking, on board, or disembarking.

4.4.2 Notwithstanding paragraph 4.4.1, a helicopter may be refuelled with passengers on board if the helicopter is undertaking ambulance or life-saving operations or when prevailing weather conditions may cause significant disembarkation and embarkation risks, provided the following conditions are met:

(a) all main exits should be available for immediate use;

(b) the external area adjacent to the exits are kept clear;

(c) two-way communications are maintained at all times between the ground crew supervising the fuelling and the pilot; and

(d) In case of helicopters where only the normal exit is on the same side as the fuelling point filler caps, then 'rotors or engine running' fuelling with passengers on board is not permitted.

4.4.3 A helicopter shall not be fuelled at onshore and offshore sites while the engines or rotors are running, unless:

(a) The helicopter is undertaking ambulance and other emergency missions requiring extreme urgency;

(b) Severe weather conditions make it inadvisable to stop engines/rotors;

(c) due to adverse and unusual operational requirements at the pilot-in-command's discretion and with agreement of the fuelling undertaker; and

(d) due to special operational requirements and after a risk assessment for the special operation has been carried out by the operator and approved by the Authority.

4.4.4 Fuelling offshore must only be carried out from helicopter landing areas approved by the Authority. Operators should ensure good fire safety practices at all times fuelling takes place, including the provision of rescue and fire fighting personnel.

Note: Further guidance on helicopter fuelling can be found in ICAO Heliport Manual – Doc. 9261 – AN/903/2.

5 ALTERNATE HELIPORTS

5.1 General

5.1.1 An operator shall establish procedures for the selection of destination and alternate heliports when planning a flight. An operator shall only authorise use of heliports that are adequate for the type(s) of helicopter and operation(s) concerned.

5.2 Take-off Alternate Heliports

5.2.1 The operator shall select and specify a take-off alternate heliport in the operational flight plan if the weather conditions at the heliport of departure are at or below the applicable heliport operating minima. For a heliport to be selected as a take-off alternate heliport, available information shall indicate that the conditions at the estimated time of use are at or above the heliport operating minima for that operation.

5.3 Destination Alternate Heliports

5.3.1 An operator conducting a flight in accordance with IFR shall specify at least one destination alternate in the operational flight plan and the flight plan, unless:

(a) the duration of the flight and the meteorological conditions prevailing are such that there is reasonable certainty that, at the estimated time of arrival at the heliport of intended landing, and for a reasonable period before and after such time, the approach and landing may be made under visual meteorological conditions; or

(b) the heliport of intended landing is isolated and no alternate is available. A point of no return (PNR) shall be determined.

5.3.2 For a heliport to be selected as a destination alternate, the available information shall indicate that, at the estimated time of use, the conditions will be at or above the heliport operating minima for that operation.

5.3.3 For a flight departing to a destination which is forecast to be below the heliport operating minima, two destination alternates should be selected. The first destination alternate should be at or above the heliport operating minima for destination and the second at or above the heliport operating minima for alternate.

5.4 Selection of Offshore Alternate Heliports

5.4.1 An offshore alternate heliport shall not be selected unless the operator has published the selection procedures in the operations manual, which has been approved by the Chief Executive. The dimensions, configuration and obstacle clearance of individual helidecks or other sites shall be assessed in order to establish operational suitability for use as an offshore alternate heliport by each helicopter type proposed to be used.

5.4.2 Offshore alternate heliports may be specified subject to the following conditions:

(a) An offshore alternate heliport shall be used only after the helicopter has flown beyond a PNR. Prior to PNRs onshore alternates shall be used;

(b) One engine inoperative landing capability shall be attainable at the alternate heliport;

(c) Deck availability shall be guaranteed. The operator shall establish procedures for guaranteeing the availability of the helideck. Where there is the possibility of the helideck being out of use due to another aircraft being scheduled to land on the helideck or for any other circumstance, the operator must seek another suitable alternate heliport;

(d) Weather minima shall be established taking into account the accuracy and reliability of meteorological information; and

(e) The MEL shall reflect essential requirements for this type of operation.

5.4.3 When operating offshore, any spare payload capacity should be used to carry additional fuel if it would facilitate the use of an onshore alternate heliport.

5.5 Offshore Alternate Deck Landing Environment, Performance and Weather Considerations

5.5.1 An operator shall provide information on the landing environment of a helideck that is proposed for use as an offshore alternate, including the physical characteristics of the helideck (including the orientation of the helideck), the effect of the wind direction and strength and turbulence. This information shall be made available to the pilot-in-command both at the planning stage of the flight and in the flight, and should be published in an appropriate form in the operations manual, such that the suitability of the helideck for use as an offshore alternate can be assessed.

5.5.2 The operator shall establish that the offshore alternate helideck meets the criteria for size and obstacle clearance appropriate to the performance requirements of the type of helicopter concerned.

5.5.3 The use of an offshore alternate shall be restricted to helicopters that can achieve one engine inoperative (OEI) in ground effect (IGE) hover at an appropriate power rating at the offshore alternate. Where the surface of the offshore alternate helideck, or prevailing conditions (especially wind velocity), precludes an OEI IGE hover, OEI out of ground effect (OGE) hover performance at an appropriate power rating should be used to compute the landing mass. The landing mass shall be calculated based on the helicopter configuration, environmental conditions and the operation of systems which have an adverse effect on performance. The planned landing mass of the helicopter, including crew, passengers, baggage, cargo plus 30 minutes of Final Reserve fuel, shall not exceed the OEI (whether IGE or OGE as appropriate) landing mass at the time of the approach to the offshore alternate.

5.5.4 An operator shall not select a helideck as a destination or offshore alternate unless the aerodrome forecast indicates that during a period commencing one hour before and ending one hour after the expected time of arrival at the destination and offshore alternate, the weather conditions will be at or above the following planning minima: cloud base 600 ft day/ 800 ft night and visibility 4km day/5km night. Where fog is forecast, or has been observed within the last two hours within 60nm of the destination or alternate, offshore alternates should not be used.

5.6 Point of No Return

5.6.1 The operator shall ensure that before passing the PNR – which should not be more than 30 minutes from the destination – the following actions should have been completed:

(a) Confirmation that navigation to the destination and offshore alternate can be assured;

(b) Radio contact with the destination and offshore alternate can be assured;

(c) The landing forecast at the destination and offshore alternate has been obtained and confirmed to be above the required minima;

(d) The requirements for landing with one engine inoperative has been checked to ensure that they can be met; and

(e) The availability of the offshore alternate should be guaranteed by the duty holder (the rig operator in the case of fixed installations and the owner in the case of mobiles) to the extent possible, having regard to information on current and forecast use of the offshore alternate and on conditions prevailing, until landing at the destination, or the offshore alternate, has been achieved (or until offshore shuttling has been completed).

6 HELICOPTER LOAD OPERATIONS

6.1 Loading Instructions

6.1.1 An operator shall ensure that loading instructions are included in the operations manual. The loading instructions shall consider the capabilities, limitations and operation of the helicopter(s) intended. The instructions shall be prepared and written in a clear, simple and concise manner for users with little or no aviation experience, such as oil rig crews and contractors' staff, to understand.

6.2 Underslung Load Operations

6.2.1 Operators shall ensure that a two-way communications system are established between the flight crew and the ground crew performing underslung load operations and shall include in the operations manual the procedures for the use of such two-way communications system.

6.2.2 All crew members performing underslung load operations shall wear protective helmets.

7 TURNING OF HELICOPTER ROTOR UNDER POWER

7.1 A helicopter rotor shall not be turned under power without a qualified pilot at the controls.

8 LOSS OF TAIL ROTOR EFFECTIVENESS

8.1 An operator shall include in its operations manual procedures to avoid and to recover from loss of tail rotor effectiveness.

9 RADIO ALTIMETER (HEIGHT BUG SETTING PROCEDURES)

9.1 Helicopters conducting over water operations shall be equipped with one radio altimeter and audio voice alerting devices.

9.2 The operator shall include in its operations manual the procedures for setting the height bug or equivalent decision height indicator. The height indicator shall be set at an appropriate level such as to give pilots “adequate” warning/reaction time.

10 PERFORMANCE

10.1 **Applicability**

10.1.1 Helicopters operating in performance Class 1 are those:

(a) operating to and from heliports located in a congested hostile environment;

(b) which have a maximum approved passenger seating of 15 or more; and

(c) with a maximum total weight authorised of 5,700 kg or more;

10.1.2 Helicopters that have a maximum approved passenger seating of less than 15 but more than 9 or with a maximum total weight authorised of less than 5,700 kg are operated in Performance Class 1 or 2.

10.1.3 Helicopters that have a maximum approved passenger seating configuration of 9 or less or with a maximum total weight authorised of less than 2,730 kg are operated in Performance Class 1, 2 or 3.

10.2 General

10.2.1 The operator shall not permit a flight to be commenced unless the performance information provided in the flight manual, supplemented as necessary with other data acceptable to the Authority indicates that the requirements of Paragraph 10 can be complied with for the flight to be undertaken.

10.2.2 In determining the requirements of the performance, the operator shall consider the following parameters:

(a) Mass of the helicopter;

(i) mass of the helicopter at the start of the take-off or in the case of in-flight replanning the point from which the revised operational flight plan applies, is not greater than the mass at which the requirement of the Performance Class can be complied with.

(b) Helicopter configuration;

(c) Environmental conditions in particular:

(i) pressure-altitude, and temperature; and

(ii) wind;

(1) For take-off, take-off flight path and landing requirements, accountability for wind shall be no more than 50 % of any reported steady head wind component of 5 knots or more;

(2) Where take-off and landing with a tail wind component is permitted in the Helicopter Flight Manual, and in all cases for the take-off flight path, not less than 150% of any reported tail wind component shall be taken into account; and

(3) Where precise wind measuring equipment enables accurate measurement of wind velocity over the point of take-off and landing, alternate wind components specific to a site may be approved by the Authority.

(d) The heli-deck slope, and the surface conditions of the heli-deck;

(e) Operating procedures; and

(f) Operation of any system which have adverse effect on performance.

10.3 **Operating Conditions**

10.3.1 For helicopters operating in performance Class 2 or 3 in any flight phase where a power unit may cause the helicopter to force land, the operator shall:

(a) Define a minimum visibility that is not be less than 1000 m for helicopters operating in performance Class 2 and 3, taking into account the characteristics of the helicopter;

(b) Verify that the surface below the intended flight path permits the pilot to execute a safe forced landing;

(c) Conduct operations in performance Class 2 only if the helicopter involved has a safe forced landing capability during take-off and landing; and

(d) Conduct operations in performance Class 3 only in a non-hostile environment.

10.3.2 Operations in performance Class 3 shall not be performed out of sight of the surface or when the cloud ceiling is less than 180 m (600 ft).

Note: Operations in performance Class 3 in IMC shall not be permitted in Singapore. This is due to the limited airspace and the congested hostile surface environment.

10.4 **Obstacle Accountability**

10.4.1 For the purpose of obstacle clearance requirements, an obstacle located beyond the FATO, in the take-off path or the missed approach flight path, shall be considered if its lateral distance from the nearest point on the surface below the intended flight path is not further than:

(a) For VFR operations:

(i) half of the minimum width of the FATO (or the equivalent term used in the helicopter flight manual) defined in the helicopter flight manual (or when no width is defined, 0.75 D), plus 0.25 times D (or 3 m, whichever is greater), plus:

(1) 0.10 DR for VFR day operations

(2) 0.15 DR for VFR night operations

(b) For IFR operations:

(i) 1.5D (or 30m, whichever is greater) plus:

(1) 0.10 DR for IFR operations with accurate course guidance

(2) 0.15 DR for IFR operations with standard course guidance

(3) 0.30 DR for IFR operations without course guidance

10.4.2 For operations with initial take-off conducted visually and converted to IFR/IMC at a transition point, the criteria required in Paragraph 10.4.1 a) shall apply up to the transition point then the criteria required in Paragraph 10.4.1 b) shall apply after the transition point.

Note: The transition point cannot be located before the end of TODRH for helicopters operating in performance Class 1 and before the DPATO for helicopters operating in performance Class 2.

10.4.3 When considering the missed approach flight path, the divergence of the obstacle accountability area shall only apply after the end of the take-off distance available.

Note: Standard course guidance includes ADF and VOR guidance. Accurate course guidance includes ILS, MLS or other course guidance providing an equivalent navigational accuracy.

10.4.4 For take-off using a backup (or a lateral transition) procedure; for the purpose of obstacle clearance requirements, an obstacle, located in the backup (or lateral transition) area, shall be considered if its lateral distance from the nearest point on the surface below the intended flight path is not further than:

(a) Half the minimum FATO (or the equivalent term used in the Flight Manual) width defined in the Helicopter Flight Manual (or, when no width is defined 0.75D) plus 0.25 times D (or 3m, whichever is greater) plus:

(i) For VFR day, 0.10 of the distance travelled from the back of the FATO; or

(ii) For VFR night, 0.15 of the distance travelled from the back of the FATO.

10.4.5 Obstacles may be disregarded if they are situated beyond:

(a) 7R for day operations if navigation accuracy can be achieved by reference to suitable visual cues during the climb.

(b) 10R for night operations if navigation accuracy can be achieved by reference to suitable visual cues during the climb.

(c) 300 m if navigational accuracy can be achieved by appropriate navigation aids; and

(d) 900 m in other cases.

10.5 **Operating area consideration.**

10.5.1 For operations in performance Class 1, the dimensions of the FATO should be at least equal to the dimensions specified in the Helicopter Flight Manual.

Note. A FATO that is smaller than the dimensions specified in the helicopter flight manual may be accepted if the helicopter is capable of a hover out of ground effect with one engine inoperative and requirements stated in Paragraph 10.6 below are met.

10.6 **Operations in performance Class 1.**

10.6.1 **Take-off and initial climb phase.**

(a) The helicopter shall be able, in the event of the failure of the critical power-unit being recognised at or before TDP, to discontinue the take-off and stop within the rejected take-off area available or, in the event of the failure of the critical power-unit being recognised at or after TDP, to continue the take-off, clearing all obstacles along the flight path by an adequate margin until it is in a position to comply with Paragraph 10.6.3.

(b) The take-off mass of the helicopter shall not exceed the maximum take-off mass specified in the helicopter flight manual for the procedure to be used and to achieve a rate of climb of 100 ft per minute at 60 m (200 ft) and 150 ft per minute at 300 m (1000ft) above the level of the heliport with the critical engine inoperative and the remaining power-units operating at an appropriate power rating, taking into consideration the parameters specified in Paragraph 10.2.2c) and Figure 1.

(c) The take-off mass shall be such that the rejected take-off distance required does not exceed the rejected take-off distance available.

(d) The take-off mass shall be such that the take-off distance required does not exceed the take-off distance available.

Note 1. As an alternative, the requirement above may be disregarded provided that the helicopter with the critical power-unit failure recognised at TDP can, when continuing the take-off, clear all obstacles from the end of the take-off distance available to the end of the take-off distance required by a vertical margin of not less than 10.7 m (35 ft) (Figure 2).

Note 2. For elevated heliports, clearance from the elevated heliport edge is shown in Figure 3.

(e) An operator shall ensure that, with the critical power-unit inoperative, all obstacles below the backup flight path (the lateral flight path) are cleared by an adequate margin. Only the obstacles in Paragraph 10.4.4 shall be considered.

10.6.2 **Take-off flight path**

(a) From the end of the take-off distance required with the critical power-unit inoperative:

(i) The take-off mass shall be such that the climb path provides a vertical clearance of not less than 10.7 m (35 ft) for VFR and 10.7 m (35 ft) plus 0.01 DR for IFR operations above all obstacles located in the climb path. Obstacles specified in Paragraph 10.4 shall be considered.

(b) When a change of direction of more than 15 degrees is made, obstacle clearance requirements shall be increased by 5m (15ft) from the point at which the turn is initiated. The turn shall not be initiated before reaching a height of 60m (200ft) above the take-off surface, unless permitted as part of an approved procedure in the operations manual.

10.6.3 **En route**

(a) The take-off mass is such that it is possible, in case of the critical power-unit failure occurring at any point of the flight path, to continue the flight to an appropriate landing site at which the conditions of Paragraph 10.6.4 can be met without flying below the appropriate minimum flight altitudes for the route to be flown.

10.6.4 **Approach, landing and balked landing (Figure 4 and 5).**

(a) In the event of the failure of the critical power-unit being recognised at any point during the approach and landing phase, before LDP, the helicopter shall, at the destination and at any alternate, after clearing all obstacles in the flight path, be able to land and stop within the landing distance available or to perform a balked landing and clear all obstacles in the flight path by an adequate margin. In case of the failure occurring after the LDP, the helicopter shall be able to land and stop within the landing distance available. The estimated landing mass at the destination or alternate should be such that:

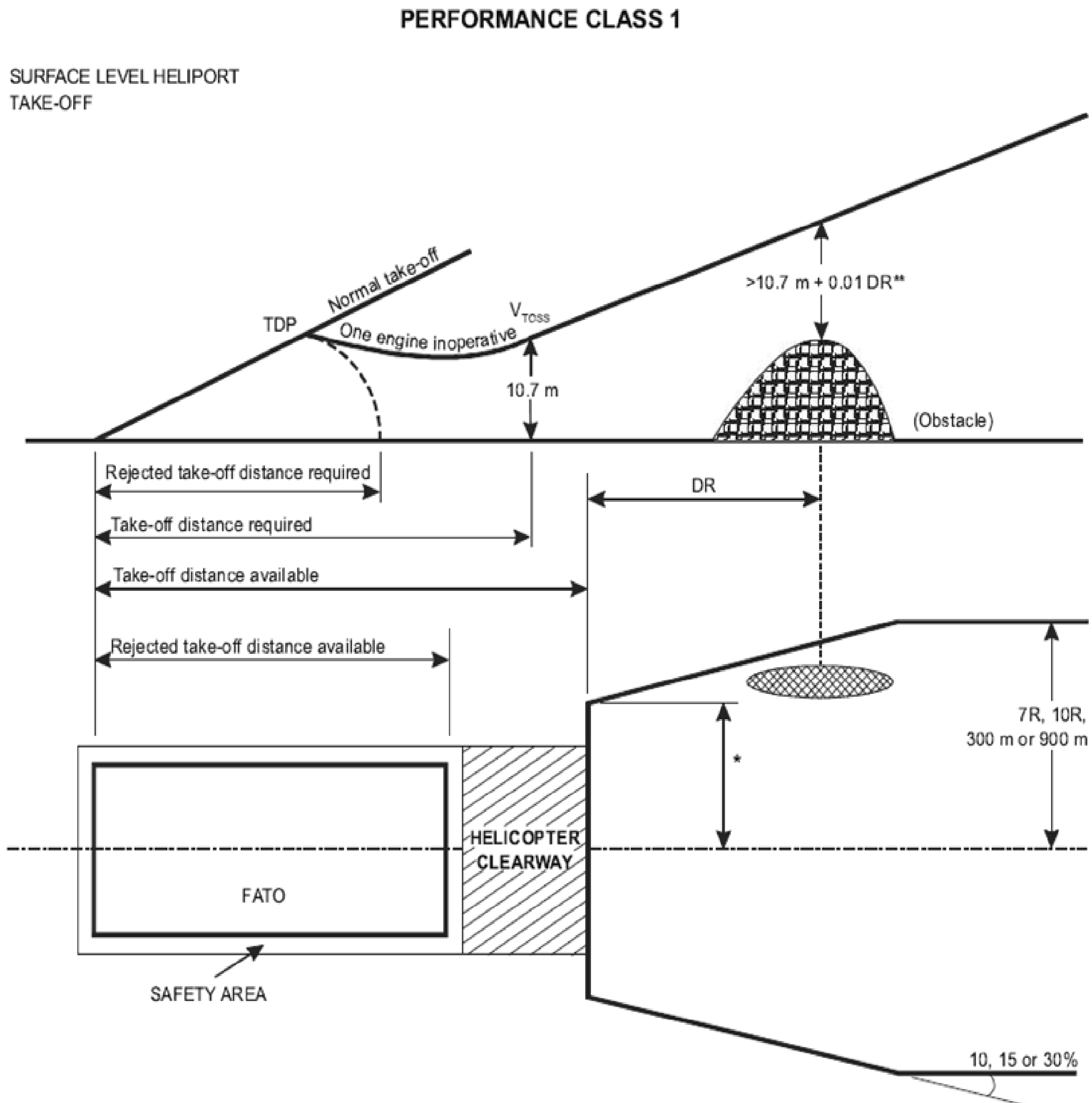
(i) It does not exceed the maximum landing mass specified in the Flight Manual for the procedure to be used and to achieve a rate of climb of 100 ft per min at 60m (200 ft) and 150 ft per min at 300m (1000 ft) above the level of the heliport with the critical engine power-unit inoperative and the remaining power-units operating at an appropriate power rating, taking into account the parameters specified in Paragraph 10.2.2.

(ii) The landing distance required does not exceed the landing distance available unless the helicopter, with the critical power unit failure recognised at LDP can, when landing, clear all obstacles in the approach path.

(iii) In the case of the critical power-unit failure occurring at any point after LDP, it is possible to land and stop within the FATO; and

(iv) In the event of the critical power-unit failure being recognised at the LDP or at any point before the LDP, it is possible to land and stop within the FATO or to overshoot, meeting the conditions of Paragraph 10.6.2.

Note : For elevated heliports clearance from the heliport edge is shown in Figure 5.



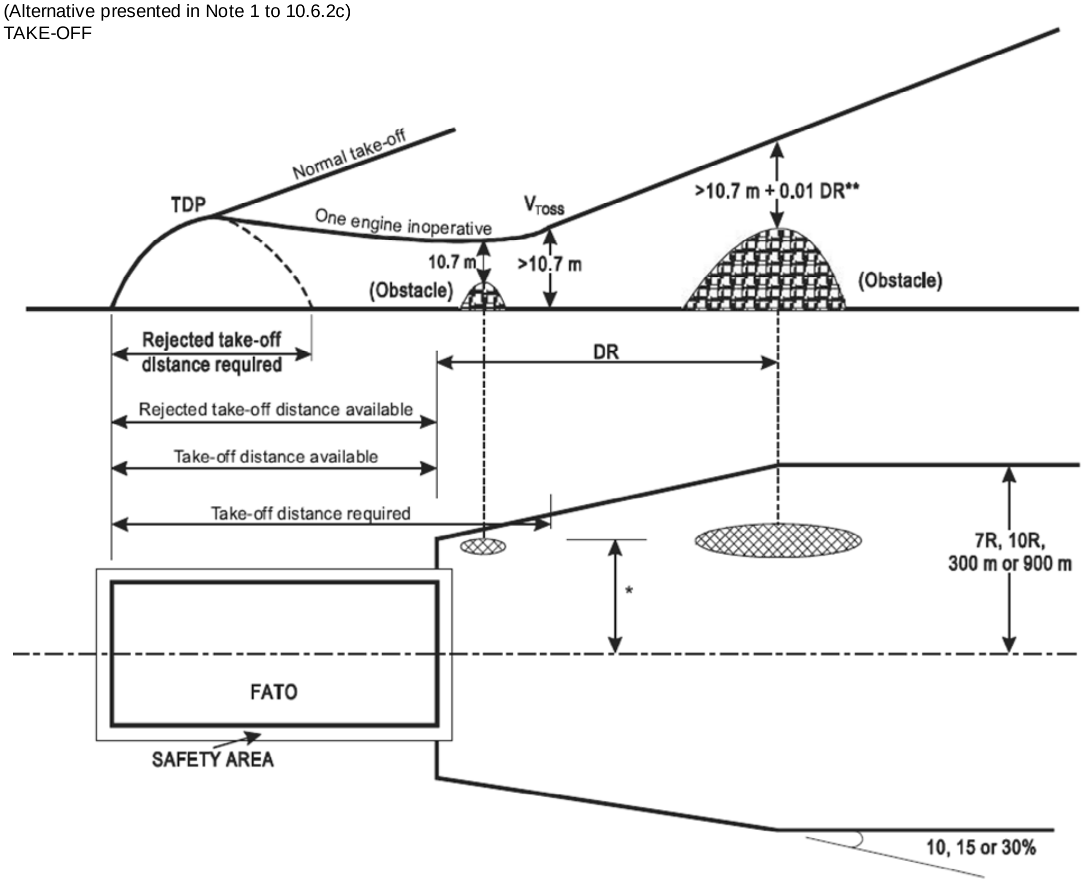
* Half of minimum FATO width defined in the HFM (or when no width defined 0.75 D) + 0.25 D (or 3 m, whichever is greater) for VFR operations. 1.5 D (or 30 m, whichever is greater) for IFR operations

** 10.7 m for VFR operations. 10.7 m + 0.01 DR for IFR operations

Figure 1

PERFORMANCE CLASS 1

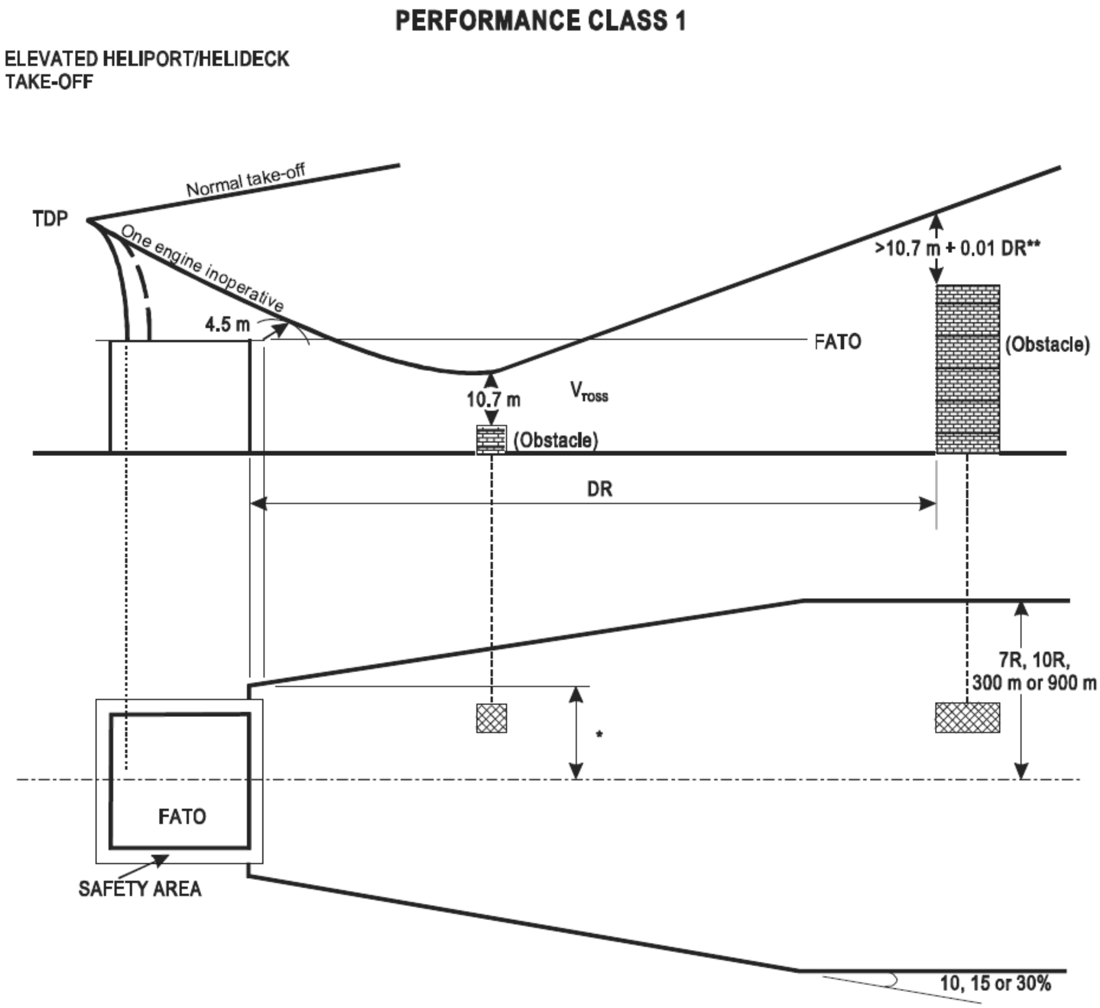
SURFACE LEVEL HELIPORT
(Alternative presented in Note 1 to 10.6.2c)
TAKE-OFF



* Half of minimum FATO width defined in the HFM (or when no width defined 0.75 D) + 0.25 D (or 3 m, whichever is greater) for VFR operations. 1.5 D (or 30 m, whichever is greater) for IFR operations

** 10.7 m for VFR operations. 10.7 m + 0.01 DR for IFR operations

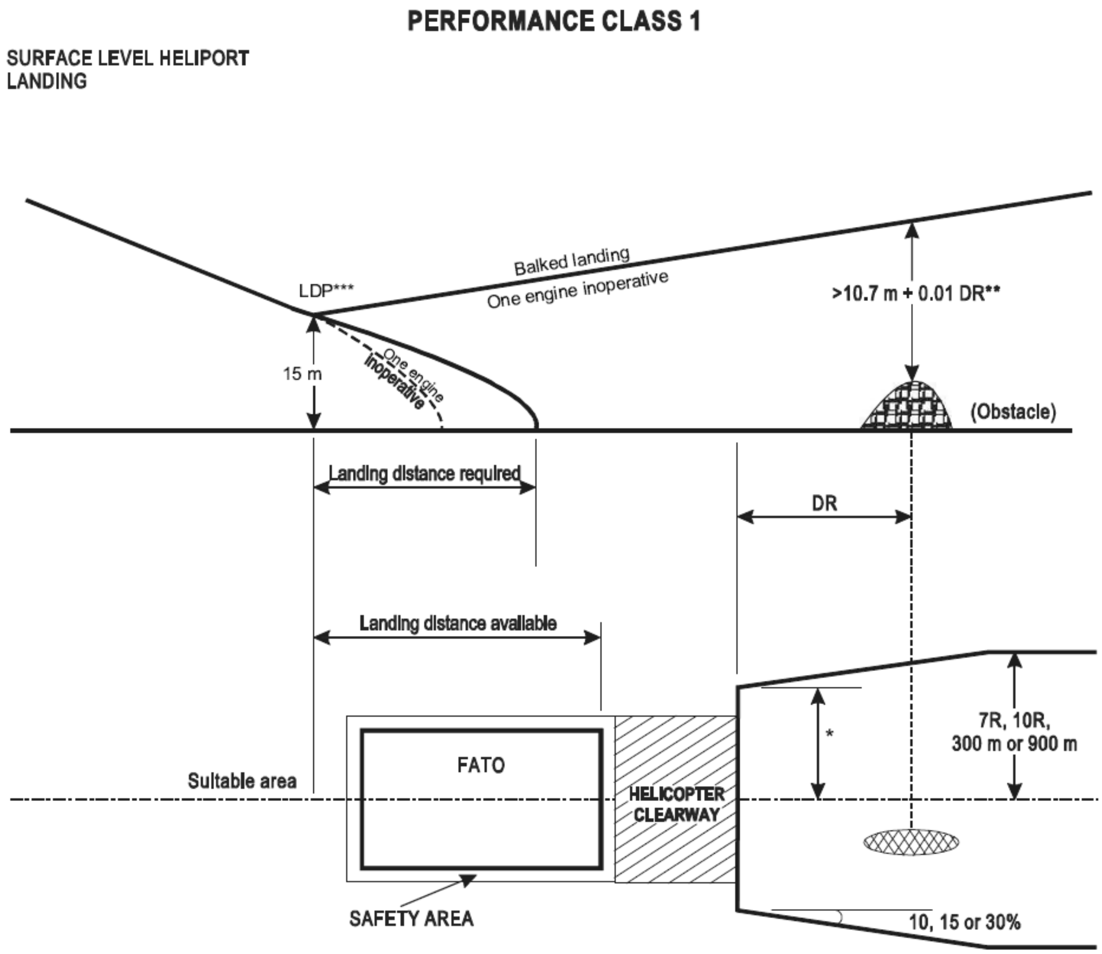
Figure 2



* Half of the minimum FATO width defined in the HFM (or when no width defined, 0.75 D) + 0.25 D (or 3 m, whichever is greater) for VFR Operations. 1.5 D (or 30 m, whichever is greater) for IFR operations.

** 10.7 m + 0.01 DR for IFR operations

Figure 3

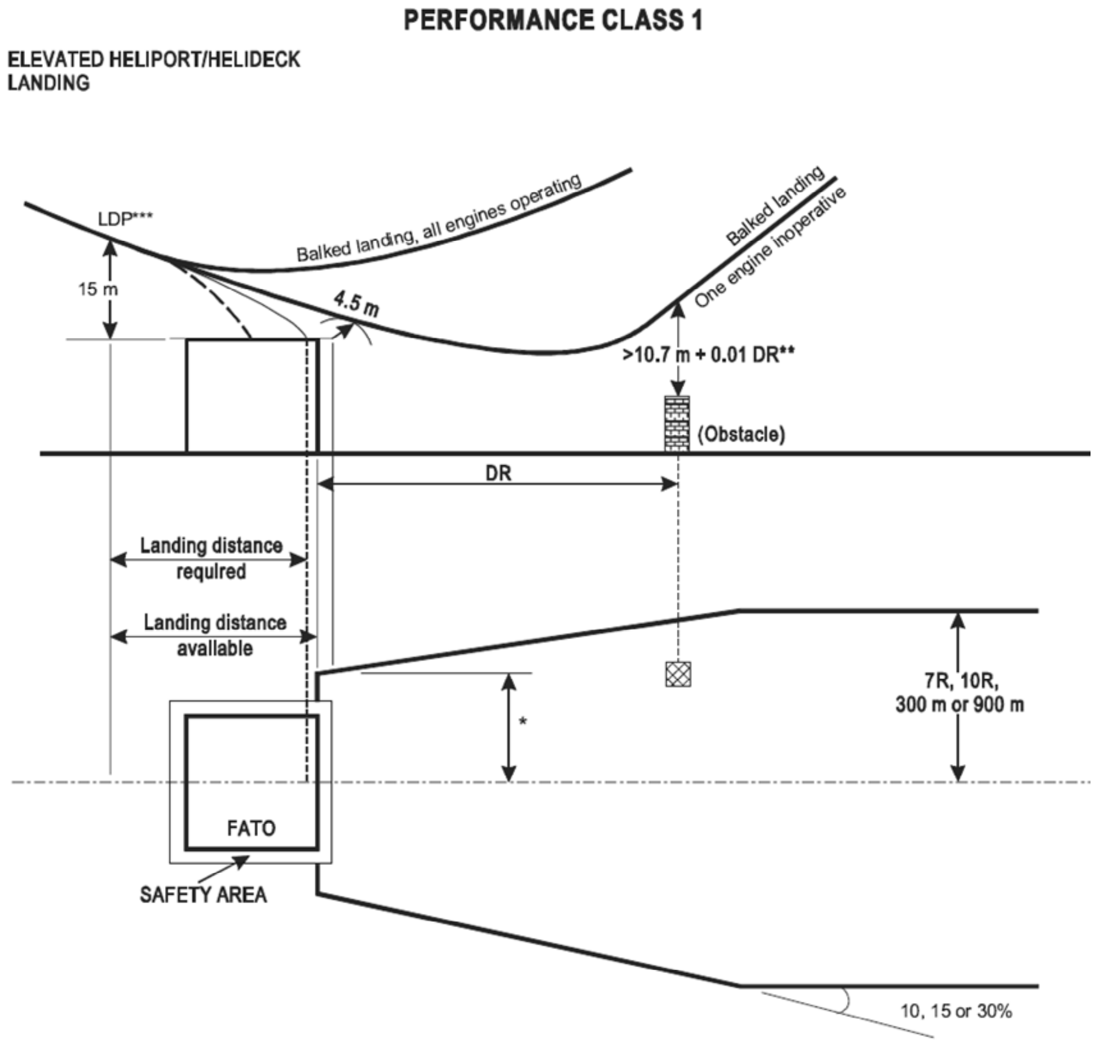


* Half of the minimum FATO as defined in the HFM (or when no width defined, 0.75 D) + 0.25 D (or 3 m, whichever is greater) for VFR operations. 1.5 D (or 30 m, whichever is greater) for IFR operations

** 10.7 m for VFR operations. 10.7 m + 0.01 DR for IFR operations

*** For the purposes of the diagram, all paths and distances emanate from 50 ft (15 m). The actual height of this point and position of the LDP should be obtained from the HFM

Figure 4



* Half of minimum FATO width defined in the HFM (or when no width defined, 0.75 D) + 0.25 D (or 3 m, whichever is greater) for VFR operations. 1.5 D (or 30 m, whichever is greater) for IFR operations

** 10.7 m for VFR operations. 10.7 m + 0.01 DR for IFR operations

*** For the purpose of the diagram, all paths and distances emanates from 50 ft (15 m). The actual height of this point and position of the LDP should be obtained from the HFM

Figure 5

10.7 Operations in performance Class 2

10.7.1 **Take-off and initial climb phase (Figure 6 and7)**

(a) The helicopter shall be able, in the event of the failure of the critical power-unit at any time after reaching DPATO, to continue the take-off, clearing all the obstacles along the flight path by an adequate margin until the helicopter is in a position to comply with the requirements in Paragraph 10.7.3. Before the DPATO, failure of the critical power-unit may cause the helicopter to force-land. Therefore the condition that appropriate consideration be given to achieve a safe forced landing applies.

(b) The mass of the helicopter at take-off should not exceed the maximum take-off mass specified in the flight manual for the procedures to be used and to achieve a rate of climb of 150 ft per minute at 300 m (1000 ft) above the level of the heliport with the critical power-unit inoperative and the remaining power-units operating at an appropriate power rating, taking into account the parameters specified in Paragraph 10.2.2.

10.7.2 **Take-off flight path**

(a) From DPATO or, as an alternative, no later than 60 m (200 ft) above the take-off surface with the critical power-unit inoperative, the conditions of Paragraph 10.6.2 shall be met.

10.7.3 **En route**

(a) The requirements of Paragraph 10.6.3 shall be met.

10.7.4 **Approach, landing and balked landing (Figure 8 and 9).**

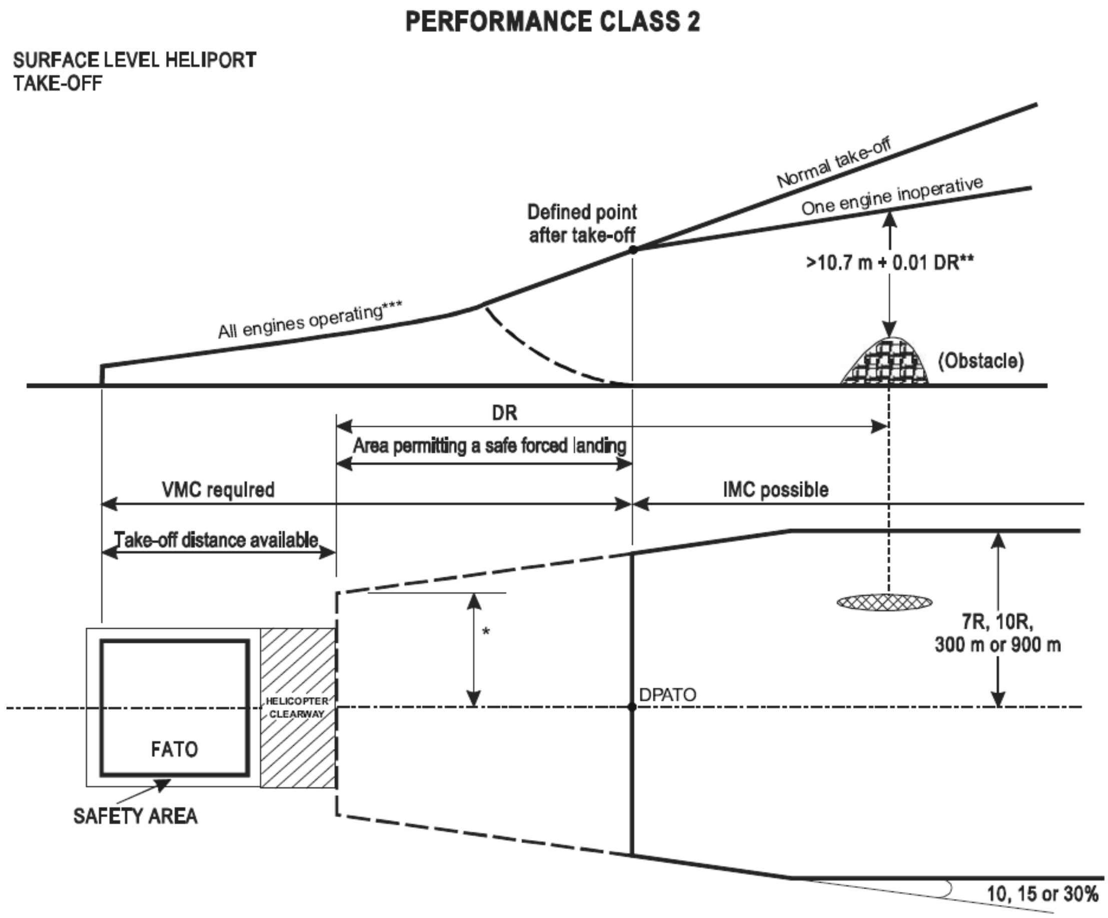
(a) In the event of the failure of the critical power-unit before the DPBL, the helicopter shall, at the destination or any alternate, after clearing all obstacles, in the approach path, be either able to land and stop within the landing distance available or to perform a balked landing and clear all obstacles in the approach path by an adequate margin. After the DPBL, failure of the power-unit may cause the helicopter to force-land. Therefore the condition that appropriate consideration be given to achieve a safe forced landing applies. The estimated landing mass at the destination or alternate should be such that:

(i) It does not exceed the maximum landing mass specified in the flight manual for a rate of climb of 150ft per min at 300m (1000ft) above the level of the heliport with the critical power-unit inoperative and the remaining power-units operating at an appropriate power rating, taking into account the parameters specified in Paragraph 10.2.2.

(ii) It is possible, in case of a power-unit failure occurring at or before the DPBL, either to perform a safe forced landing or to overshoot, meeting the requirements of Paragraph 10.6.2.

10.7.5 Operations in performance Class 2 shall take into account the obstacle accountability requirements specified in Paragraph 10.4.

s



* 0.75 D +0.25 D (or 3 m, whichever is greater) for VFR operations. 1.5 D (or 30 m, whichever is greater) for IFR operations

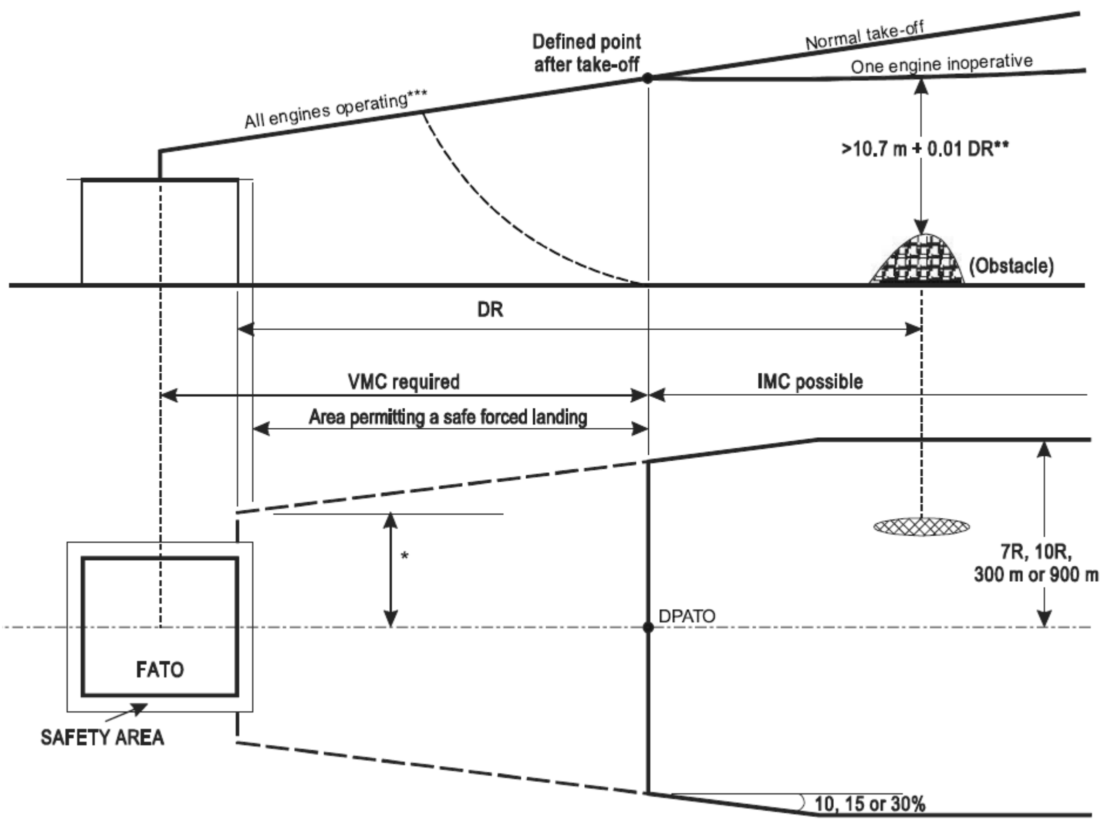
** 10.7 m for VFR operations. 10.7 m + 0.01 DR for IFR operations.

*** Only the all engines-operating flight path is shown

Figure 6

PERFORMANCE CLASS 2

ELEVATED HELIPORT/HELIDECK
TAKE-OFF

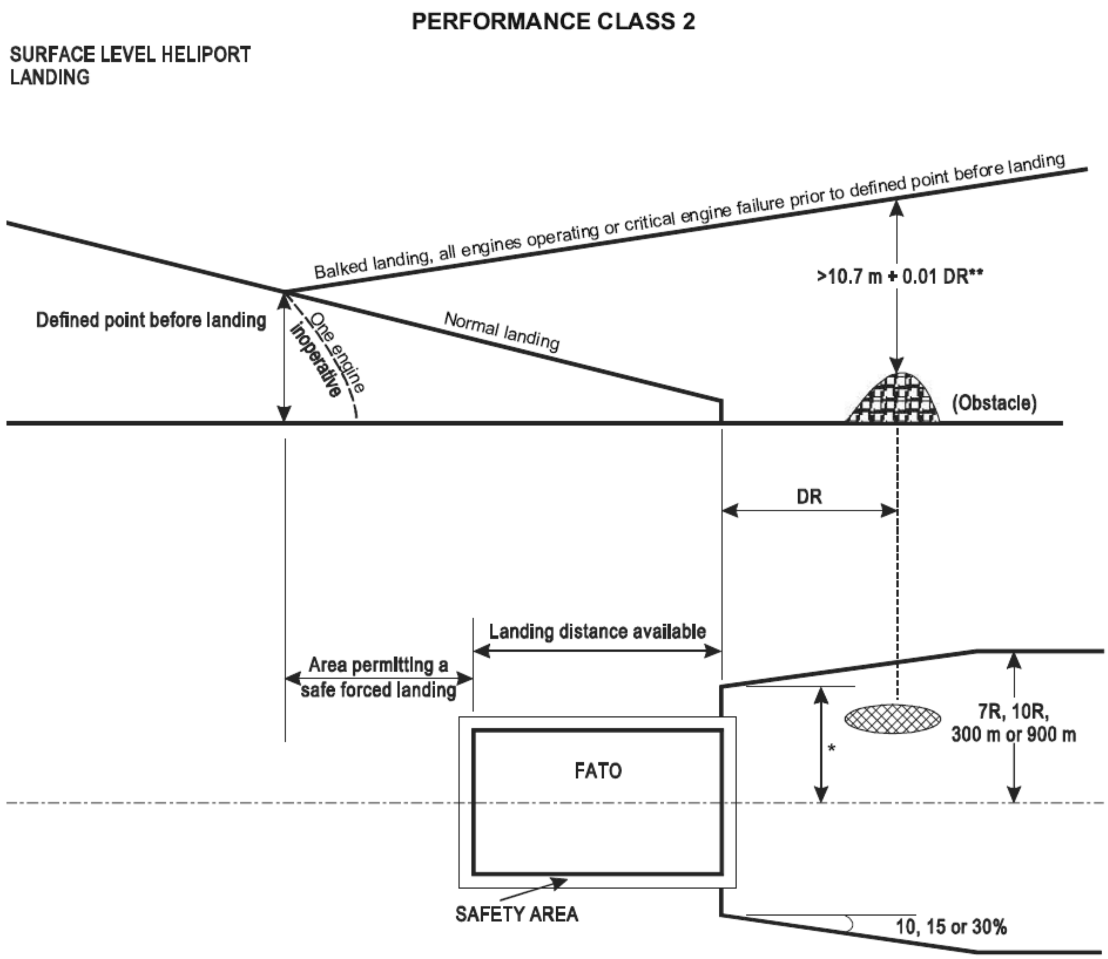


* 0.75 D +0.25 D (or 3 m, whichever is greater) for VFR operations. 1.5 D (or 30 m, whichever is greater) for IFR operations.

** 10.7 m for VFR operations. 10.7 m + 0.01 DR for IFR operations.

*** Only the all engines-operating flight path is shown.

Figure 7

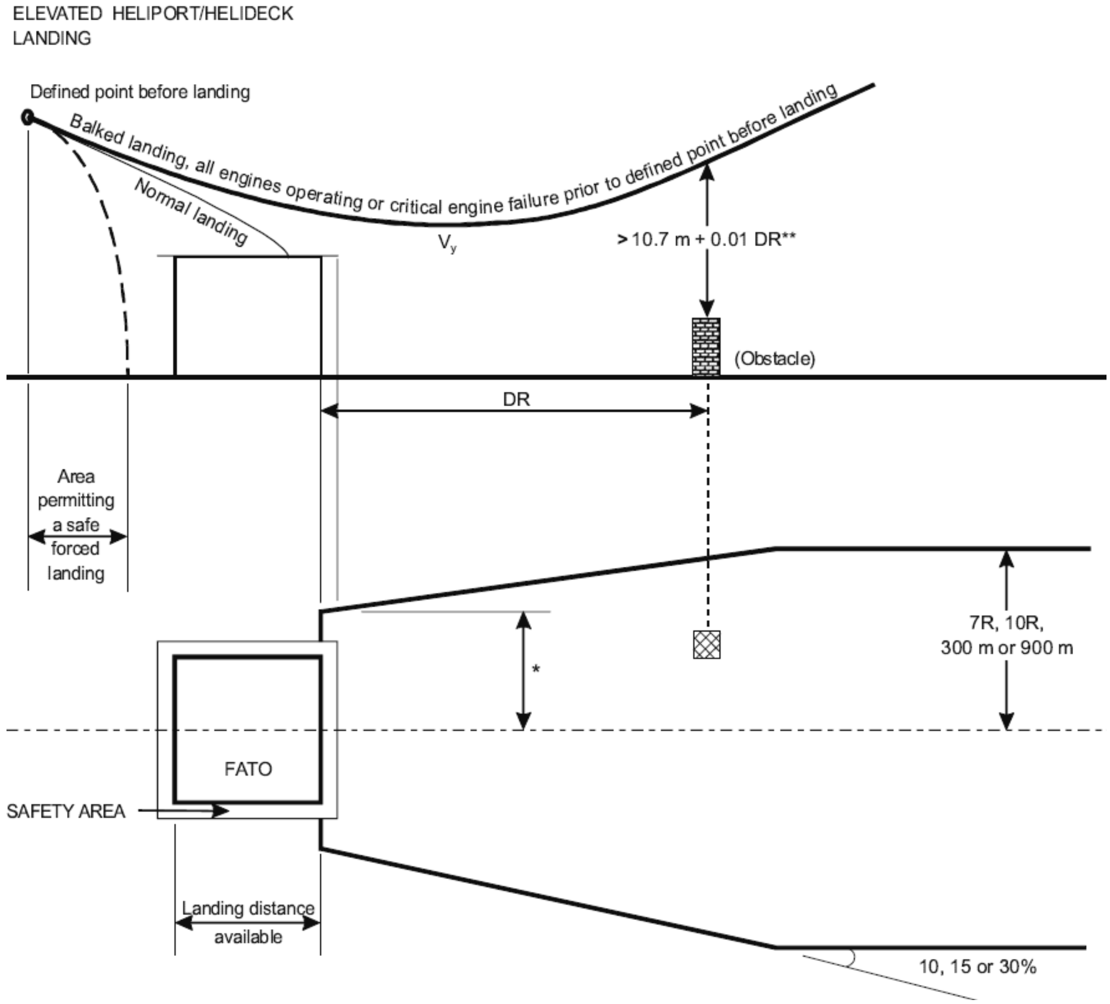


* 0.75 D +0.25 D (or 3 m, whichever is greater) for VFR operations. 1.5 D (or 30 m, whichever is greater) for IFR operations.

** 10.7 m for VFR operations. 10.7 m + 0.01 DR for IFR operations

Figure 8

PERFORMANCE CLASS 2



* 0.75 D +0.25 D (or 3 m, whichever is greater) for VFR operations. 1.5 D (or 30 m, whichever is greater) for IFR operations.

** 10.7 m for VFR operations. 10.7 m + 0.01 DR for IFR operations

Figure 9

10.8 Operations in performance Class 3

10.8.1 Take-off

(a) The mass of the helicopter at take-off shall not exceed the maximum take-off mass specified in the flight manual for a hover in ground effect with all power-units operating at take-off power, taking into account parameters specified in Paragraph 10.2.2. If the conditions are such that a hover in ground effect is not likely to be established, the take-off mass should not exceed the maximum mass specified for a hover out of ground effect with all power-units operating at take-off power, taking into account the parameters specified in Paragraph 10.2.2.

10.8.2 Initial climb

(a) The take off mass shall be such that the climb path provides adequate vertical clearance above all obstacles located along the climb path, all engines operating.

10.8.3 En route

(a) The take-off mass is such that it is possible to achieve the minimum flight altitudes for the route to be flown, all engines operating. At any point of the flight path, failure of a power-unit will cause the helicopter to force-land. Therefore the condition that appropriate consideration be given to achieve a safe forced landing applies.

10.8.4 Approach and landing

(a) At any point of the flight path, failure of a power-unit will cause the helicopter to force-land. Therefore the condition that appropriate consideration be given to achieve a safe forced landing applies. The estimated landing mass at the destination or alternate should be such that:

  (i) it does not exceed the landing mass specified in the flight manual for a hover in ground effect with all power-units operating at take-off power, taking into account the parameters specified in 5.5.3. If conditions are such that a hover in ground is not likely to be established, the take-off mass should not exceed the maximum mass specified in a hover out of ground effect with all power-units operating at take-off power, taking into account the parameters specified in Paragraph 10.2.2; and

  (ii) it is possible to perform a balked landing, all engines operating, at the point of the flight path and clear all obstacles by an adequate vertical interval.

11 FLIGHTS IN VMC AT NIGHT

11.1 General

11.1.1 In Singapore a helicopter flying at night shall be flown in accordance with the IFR unless it is within control zone on a Special VFR flight.

11.2 Flight Crew Qualification

11.2.1 An operator shall ensure that a pilot does not fly as pilot-in-command at night in VMC unless the pilot has:

(a) A minimum of 300 hours total flight time on helicopters which includes 100 hours as pilot-in-command and 10 hours at night as pilot flying; and

(b) Performed at least 3 take-offs, three circuits and three landings at night in the preceding 90 days;

11.3 Weather Minima

11.3.1 An operator shall specify in its operations manual the weather minima for VMC night flights. Minima shall be specified for the following cases:

(a) Where the helicopter and/or flight crew is not equipped for and capable of intentionally flying under IMC conditions; and

(b) Where the helicopter and/or flight crew is equipped for and capable of flying under IMC conditions and subsequently making either an instrument approach to an airfield or regaining VMC.

11.3.2 For the purpose of Paragraph 11.3.1 a), a helicopter and/or flight crew is considered capable of flying under IMC conditions if the following conditions are met:

(a) The crew must be qualified for flying under IFR conditions i.e holding an instrument rating and with appropriate training and checking;

(b) The operator has specified procedures for flights under IFR conditions;

(c) The helicopter is equipped for IFR flight; and

(d) The weather conditions and fuel state met the minimum requirements stated in this Manual for the intended IFR flight and any required diversion.

11.3.3 For night flight in VMC with visual ground reference, the aircraft altitude must be capable of being assessed by reference to a clearly distinguishable external horizon that may be provided either by natural lighting or artificial lights spread deeply and widely across the track.

11.4 Night Weather Limits

11.4.1 For a non-IMC capable crew/helicopter combination flying in VMC at night by visual ground reference, the visibility shall not be less than 5 km and the forecast cloud base for the route shall not be less than 1500 ft above the highest terrain within 5 NM of the route. If the weather deteriorates en-route below the specified minima, the helicopter shall divert, return to the place of departure.

11.4.2 For an IMC capable crew/helicopter combination flying in VMC at night by visual ground reference, the visibility shall not be less than 5 km and the forecast cloud base for the route shall not be less than 1200 ft above the highest terrain within 5 NM of the route. If the weather deteriorates en-route below the specified minima, the helicopter shall divert, return to the place of departure or continue the flight in IMC.

11.4.3 An operator may operate under relaxed weather limits in very specific areas of operation such as flights that are wholly within the confines of a well illuminated urban area or a well illuminated line feature or within local areas associated with the company operating base, subject to the approval of the Authority. Operators shall demonstrate an equivalent level of safety case for consideration by the Authority and include the relevant instructions in the operations manual.

12 TRAINING AND TESTING

12.1 General

12.1.1 The periodical tests for helicopter pilots shall be based, as far as it is practicable to do so, on those for aeroplane pilots set out in Chapter 4 of the AOCR.

12.1.2 The periods of validity of the various tests are as follows:

(a) type rating Certificate of Test, Bi-annual Base Checks are normally valid for a period of 6 months; additionally, if the same test has been passed on two occasions, separated by an interval of not less than 4 months, rating is valid for 12 consecutive months from the first of the two tests;

(b) instrument ratings test, line checks and emergency/survival checks as detailed in Chapter 6 of the AOCR are valid for 12 months.

12.1.3 Pilots-in-command and co-pilots shall be checked in their respective seats unless in the case of pilots-in-command whose duties also require them to carry out duties of the co-pilot, or in the case of pilots-in-command who are required to conduct training or examining duties, in which case they shall complete their proficiency checks respectively from left to right-hand seats, on alternate proficiency checks.

12.2 Line Checks

12.2.1 The Operator shall ensure that the content of the line check reflects the wide variety of roles in which pilots may be engaged in. In any event the duration of the annual line check should not be less than 40 minutes.

12.2.2 Conduct of the line check shall closely follow the requirements of Paragraph 3.1 of Chapter 4 of the AOCR. For pilots who are required to operate at night or under

IMC, the check must include an appropriate sector and certification. The airways section of the instrument rating renewal may be counted as satisfying the IMC requirement.

12.3 Base Checks

12.3.1 Base checks may embrace a VMC part and an IMC part. It is acceptable to treat the VMC and IMC parts as separate checks, each with the period of validity stated in paragraph 12.1.2a). It may be preferable to conduct the VMC part alternately by day and night, so that those items which are appropriate to night operation, and those which should only be attempted in daylight are checked at least annually. Operators shall ensure that pilots comply with the Eighth Schedule of the ANO in respect of night flying recency.

12.3.2 The content of a VMC competency check shall include the following items where applicable to the type of helicopter:

(a) engine failure before and after the decision point for each take off profile and each landing profile that is in use by the operator and is published in the Operations Manual;

(b) flight and engine control systems malfunctions for which accepted procedures are included in the Helicopter Flight Manual; and

(c) autorotation to a designated area with powered recovery to forward or hovering flight.

12.3.3 The content of the IMC competency check shall include the following items where applicable to the type of helicopter:

(a) 3D instrument approach operation to minima with, in the case of multi-engined helicopters, a simulated failure of one engine;

(b) approach operation to minima;

(c) where appropriate to the helicopter type, approach with flight control system/flight director system malfunction, flight instrument and navigation equipment failures;

(d) at least one instrument approach should be flown with a degradation of the flight control system/auto-pilot;

(e) recovery from unusual attitudes and techniques for auto-rotation in IMC; and

(f) correct crew procedures in IMC descent enroute, where applicable.

12.3.4 Competency checks for handling emergencies such as tail rotor failure, double engine failure, icing problems, or situations which would be impossible or only possible with an unacceptable risk to practice in flight shall be covered in a simulator or by verbal evaluation on the ground.

12.4 Instrument Approach Proficiency

12.4.1 At least one instrument approach shall be flown in IMC conditions (either actual or simulated) proficiency to satisfy the requirements for a pilot's instrument approach proficiency. The approach shall be carried to a position from which a successful landing could have been made and this may form part of the proficiency check.

12.5 Instrument Rating (Helicopters)

12.5.1 The helicopter Instrument rating is valid only in respect of the helicopter type on which the test was conducted with the exception of the airways section which need only be conducted on one type in the case of a multi-type rated pilot.

12.6 Proficiency Checks –Night flying in VMC conditions

12.6.1 The initial Proficiency Check shall be conducted at night. Thereafter, each alternate Proficiency Check shall be conducted at night. A Proficiency Check conducted at night shall qualify a pilot for both day and night operations.

12.7 Low visibility take-off and Category II and III operations

12.7.1 An operator shall establish a training syllabus and programme for flight crew members conducting low visibility take-off, Category II and III operations. The training syllabus shall satisfy the requirements contained in Appendix U and shall be approved by the Authority. The training syllabus shall be included in the Operations Manual.

12.7.2 An operator shall not assign flight crew members to conduct low visibility take-off, Category II and III operations unless they have successfully completed the training and checking requirements prescribed in the training syllabus and programme.

12.7.3 The flight crew qualification shall be specific to the type of operation and the helicopter.

12.8 Conduct of Specialist Task Checks

12.8.1 An operator shall establish procedures in the operations manual to conduct role checks for specialists engaged to conduct specialised tasks, including:

(a) manoeuvres in confined areas or over rough or uneven ground;

(b) over water operations, including winching;

(c) underslung loads; and

(d) power line "stringing".

12.9 Operations to Oil and Gas Installations and Vessels at Night

12.9.1 Operators conducting operations in offshore sites shall ensure that pilots undertaking the operations are initially qualified in night deck landings and thereafter, remain recent.

12.9.2 An initial night deck landing qualification will qualify a pilot to land on and depart from an installation at night. The qualification shall be valid for 12 months and may be revalidated by operating to a deck at night within the 12 month period. A pilot whose night deck recency has expired may operate to a deck at night provided he does not act as the pilot-in-command, is in-date for day deck landings and is accompanied by an experienced supervising pilot-in-command.

APPENDIX A

FORMAT OF THE AIR OPERATOR CERTIFICATE AND OPERATIONS SPECIFICATIONS

EFFECTIVE DATE : 30 NOVEMBER 2015
REVISION NO : 29 (ISSUE 3)

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CAAS

Air Operator Certificate

1. State of Operator:

Republic of Singapore

2. Issuing Authority:

Civil Aviation Authority of Singapore

3.	4.	5.
AOC Number: ______ Expiry Date: ______	Operator Name: ______ Dba Trading Name: ______ Operator address: ______ ______ ______ Telephone: ______ Fax: ______ E-mail: ______	Operational Point of Contact:

6.

Pursuant to Paragraph 87 of the Singapore Air Navigation Order 1985 (as amended), the Director-General of Civil Aviation hereby certifies that the above named Operator is competent to secure the safe operation of the types of aircraft stipulated in the Operations Specifications and in accordance with the Operations Manual.

This Air Operator Certificate is granted subject to the conditions attached hereto.

7.	8.	
Date of issue: ______	Signature: ______ Name and Title: ______	Authority Stamp:

CAAS(AW)69

Refer to the attached copy of the Certificate:

Block 1 Specify the name of the State of the Operator, i.e. Republic of Singapore

Block 2 Specify the issuing Authority, i.e. Civil Aviation Authority of Singapore

Block 3 Unique AOC number, as issued by the Authority.

Date after which the AOC ceases being valid (dd-mmm-yyyy, e.g. 01 Jan 2010).

Block 4 The Operator registered name.

Operator trading name, if different. Dba means "Doing business as".

Operator principal place of business address.

Operator principal place of business telephone and fax details, including the country code.

E-mail to be provided if available.

Block 5 The contact details include the telephone and fax numbers (including the country code) and the e-mail address (if available) at which operational management can be contacted without undue delay for issues related to flight operations, airworthiness, flight and cabin crew competency, dangerous goods and other matters as appropriate.

Block 6 Regulation which the AOC is granted.

Block 7 Issuance Date of the AOC (dd-mmm-yyyy, e.g., 01 Jan 2010).

Block 8 Title, name, signature of the Authority representative and the official stamp of the Authority.

CONDITIONS APPLYING TO THE OPERATION OF ANY AIRCRAFT

1 The holder of this Certificate shall give to the Director-General of Civil Aviation, Civil Aviation Authority of Singapore, not less than 30 days' notice in writing of the intended abolition of any of the following posts (or equivalent appointments), or of any intended change in the person holding the post, or his duties:-

a) Chief executive officer/Managing Director (AOC Accountable Manager)
b) Head of Flight Operations
c) Head of Training
d) Head of Safety / Security
e) Chief Pilot(s)
f) Head of Engineering
g) Head of Quality
h) Head of Ground Operations
i) Other members of senior management as appropriate to individual AOC Holder

2 Any person authorised by the Director-General of Civil Aviation in that regard shall have access to any premises in the occupation or control of the holder of this Certificate for the purpose of examining the premises and any document, equipment, tools, materials or other thing of whatsoever nature, relating to the operation of aircraft thereunder kept or used or intended to be used in connection with the operation of the aircraft.

3 Any person appointed by the Director-General of Civil Aviation to be an Authorised Officer shall be permitted at any time to board and fly in any aircraft operated under this Certificate, and to enter and remain on the flight deck; provided that pilot-in-command of the aircraft may refuse to allow the Authorised Officer to enter or remain on the flight deck if, in his opinion, the safety of the aircraft would thereby be endangered.

4 Any person appointed by the Director-General of Civil Aviation to be an Authorised Officer shall be permitted to board and fly in any aircraft or FTD/simulator in which any person is given a periodical test by or on behalf of the holder of this Certificate in pursuance of paragraph 26 of and Part B of the Ninth Schedule to the Singapore Air Navigation Order as amended, or any provision in substitution thereof. The Authorised Officer shall be permitted to witness the test and may for that purpose enter and remain on the flight deck; provided that the pilot-in-command of the aircraft may refuse to allow him to enter or remain on the flight deck if, in his opinion, the safety of the

5 The holder of this Certificate shall furnish to the Director-General of Civil Aviation a copy of every operations manual and of all other written instructions to his operating staff, for the time being in effect concerning the operation of the aircraft under this Certificate.

6 Every flight under this Certificate shall be conducted in accordance with the relevant provisions of the aforesaid operations manual and instructions. The type of operations approved will be specified in the Operations Specifications.

7 Aerodrome and En route minima – The holder of this certificate is approved to use and operate the minima as specified in the aviation charts specified in the approved Operations Manuals.

8 The holder of this Certificate shall give to the Director-General of Civil Aviation not less than 30 days' notice in writing of any intended change in the employment or cessation of the employment of a Contractor to maintain any of the aircraft or any part of its equipment, including its radio station, or any intended change in the duties of the Contractor in that regard.

NOTE: This Certificate shall not be valid during the continuance of the breach of any condition thereof; provided that a breach of a condition which relates only to a particular type of aircraft shall not render this Certificate invalid in respect of any other type of aircraft.

OPERATIONS SPECIFICATIONS
(Subject to the conditions in the approved Operations Manual and MEL)

1. **ISSUING AUTHORITY CONTACT DETAILS**

Telephone: Fax: E-mail:

2. AOC No: Operator Name: Date: Signature:
Dba Trading Name:

3. Aircraft Model :

4. Types of operation: Public Transport - ❐ Passengers ❐ Cargo ❐ Other …………

5. Area of Operation:

6. Special Limitations:

Special Authorisations	**Yes**	**No**	**Specific Approval**	**Remarks**
7. Dangerous Goods	❐	❐		
8. Low Visibility Operations				
Approach & Landing	❐	❐	CAT _____ RVR _____ m DH ____ ft	
Take-off	❐	❐	RVR _____m	
Operational credits	❐	❐		
9. RVSM ❐ NA	❐	❐		
10. EDTO (ETOPS) ❐ NA	❐	❐	Threshold Time_____ minutes Maximum Diversion Time _____ minutes	
11. Navigation Specifications for PBN operations	❐	❐		
12. Continuing Airworthiness				
13. EFB				
14. Others	❐	❐		

Refer to the attached copy of the Operations Specifications:

Block 1	Telephone, fax contact details (including the country code) and E-mail of the Authority.
Block 2	Associated AOC number. Operator registered name and the operator trading name, if different. Dba means "Doing business as". Issuance date of the operations specifications (dd-mmm-yyyy, e.g. 01 Jan 2010) and signature of the Authority representative.
Block 3	Insertion of the Commercial Aviation Safety Team (CAST)/ICAO designation of the aircraft make, model and series, or master series, if a series has been designated (e.g. Boeing-737-3K2 or Boeing-777-232). The CAST/ICAO taxonomy is available at: http://www.intlaviationstandards.org/.
Block 4	For other, specify the type(s) of operation(s). (e.g. emergency medical service).
Block 5	Listing of geographical area(s) of authorised operation according to the corresponding aircraft model (by geographical coordinates or specific routes, flight information region or national or regional boundaries). May indicate as "Worldwide" if aircraft model is authorised to operate so. Otherwise refer to Attachment A-XXX, Approved Routes, (where XXX is the subject aircraft model) for areas of authorised operation. If authorised areas of operation are the same for all aircraft models, then refer to same Attachment A, without the need for pre-fix, -XXX.
Block 6	Listing of applicable special limitations (e.g. VFR only, Day only, etc.).
Block 7	List in the most permissive criteria for each approval or the approval type for Dangerous Goods if applicable (with appropriate criteria), in accordance ICAO Technical Instructions (TI) for the Safe Transport of Dangerous Goods by Air.

Block 8	Insertion of applicable precision approach category: CAT I, II, IIIA, IIIB or IIIC. Insertion of minimum RVR in meters and Decision Height in feet. One line is used per listed approach category. Insertion of approved minimum take-off RVR in meters. One line per approval may be used if different approvals are granted. List the airborne capabilities (i.e. automatic landing, HUD, EVS, SVS, CVS) and associated operated operational credit(s) granted.
Block 9	Not Applicable box may be checked only if the aircraft maximum ceiling is below FL290.
Block 10	Extended diversion time operations (EDTO). Not applicable checkbox may be checked when the maximum diversion time is less than or equal to 60 minutes. When the diversion time exceeds the threshold time, the operation is considered to be an EDTO (ETOPS).
Block 11	Performance-based Navigation (PBN): one line to be used for each PBN specifications authorisation (e.g. RNAV 10, RNAV 1, RNP 4…), with appropriate limitations or conditions listed in the “Specific Approvals” and/or “Remarks” columns. Limitations, conditions and regulatory basis for operational approval associated with the Performance-based Navigation specifications (e.g. GNSS, DME/DME/IRU …).
Block 12	Insert the name of the person/organisation, responsible for ensuring that the continuing airworthiness of the aircraft is maintained and the regulation which requires the work, i.e. within the AOC regulation or a specific approval (e.g. AOCR).
Block 13	List the EFB functions with any applicable limitations.
Block 14	Other authorisations or data can be entered here, using one line (or one multi-line block) per authorisation (e.g. special approach authorisation, MNPS, approved navigation performance, Ultra Long range, Polar Routes, Multi Fleet Flying, Relieve Pilot in Cruise, Pilot Transit Inspection etc.).

Attachment A-XXX: Approved Routes

OPERATOR NAME:

AOC NUMBER:

APPROVED ROUTES

Aircraft operations outside the territory of the Republic of Singapore

The routes below shall be conducted over the routes defined in approved aeronautical information publications (AIPs).

The following routes are approved routes:

Forward Route	Return Route	Effective Period

Aircraft Operations within the territory of the Republic of Singapore

The aircraft operations shall be in accordance with the Singapore AIP and the Singapore Air Navigation Order.

Attachment B: Aircraft Maintenance

OPERATOR NAME:

AOC NUMBER:

AIRCRAFT MAINTENANCE

1 General

Every aircraft operated under this Certificate shall be maintained in accordance with the relevant provisions of the holder's Maintenance Control Manual_________________ (document number)

The holder of this Certificate shall provide a comprehensive maintenance programme in his currently effective Maintenance Control Manual to fulfil his responsibility to maintain the aircraft in an airworthy condition in accordance with the Air Navigation Order, the Singapore Airworthiness Requirements, the Air Operator Certificate Requirements, Airworthiness Notices, Advisory Circulars, and other requirements prescribed by the Director-General of Civil Aviation.

Irrespective of the type of operation to be conducted by the holder of this Certificate, the continuous airworthiness and inspection programme limitations which are described and specified herein shall be applicable to all aircraft listed and authorised for use in this Certificate.

2 Check, Inspection and Overhaul Time Limits

Every aircraft and its component parts, accessories, and appliances shall be maintained in an airworthy condition in accordance with the maximum time limits set forth in the approved maintenance schedule for the accomplishment of the overhaul, periodic inspections, and routine checks of the aircraft and its component parts, accessories, and appliances.

Attachment B: Aircraft Maintenance

Approved Maintenance Schedules

Aircraft Make/Model/Series	Maintenance Schedule Ref No

3 Reliability Programme

Reliability control shall be accomplished in accordance with the approved reliability control programme manual. The holder of this Certificate is authorised to utilise the provisions of the approved reliability control programme which contains the standards for determining maintenance intervals and processes.

4 Short-Term Escalation Authorisation *(if authorised)*

The procedure for short-term escalation of maintenance intervals is contained in the Certificate holder's Maintenance Control Manual. Short-term escalation procedures do not apply to the following:

(a) Intervals specified by Airworthiness Directives.

(b) Life limits specified by Type Certificate Data Sheets, flight manuals, or manufacturer's publications.

(c) Limitations specified by Minimum Equipment Lists.

(d) Structural sampling periods imposed by maintenance review boards.

Attachment B: Aircraft Maintenance

5 Maintenance Contractual Arrangements Authorisation

The holder of this Certificate is authorised to utilise the provisions of a contractual agreement with _______________ (name of airline/maintenance organisation), a copy of which is on file with the holder of this Certificate and with the Authority, for maintenance of aircraft operated under this Certificate in accordance with the approved schedule(s).

6 Parts Pool Authorisation *(if authorised)*

The holder of this Certificate is authorised, subject to the conditions and limitations specified below, to participate in a parts pool agreement.

(a) Only those parts pool participants specified in the Maintenance Control Manual shall be eligible to provide parts to the holder.

(b) The holder shall not utilise any part provided by any participant identified in the Maintenance Control Manual unless such part meets with the applicable provisions of the Air Navigation Order, CAAS airworthiness requirements and the Maintenance Control Manual.

7 Parts Borrowing Authorisation *(if authorised)*

The holder of this Certificate, when in need, may borrow a part from another operator (or from a parts pool if the operator is a participant of a parts pool agreement) provided such part meets with the applicable provisions of the Air Navigation Order, CAAS airworthiness requirements and the Maintenance Control Manual.

Attachment B: Aircraft Maintenance

8 Ferry Flight Authorisation *(if granted)*

This ferry flight authorisation authorises the holder of this Certificate to fly any aircraft operated under the Certificate that may not meet applicable airworthiness requirements but is capable of safe flight, to a base where the necessary maintenance or alterations can be performed.

(a) A copy of this Certificate, or appropriate sections of the Maintenance Control Manual containing a restatement of this authorisation, shall be carried on board the aircraft when operating under a special flight authorisation.

(b) Before operating an aircraft that does not meet applicable airworthiness requirements, the AOC holder shall make a determination that the aircraft can safely be flown to a station where maintenance or alterations can be performed. In addition, the AOC holder will have the aircraft inspected in accordance with procedures contained in the maintenance manual and have a certificated engineer certify in the aircraft technical log that the aircraft is in safe condition for the flight as specified in the maintenance manual.

(c) Only flight crew members and persons essential to operations of the aircraft shall be carried aboard during such authorised flights where the aircraft flight characteristics may have been altered appreciably or the flight operations affected substantially.

(d) Operating weight of the aircraft must be the minimum necessary for the flight with necessary reserve fuel load.

(e) Flight shall be conducted in accordance with appropriate special conditions or limitations contained in the Maintenance Control Manual.

(f) This authorisation does not permit operation of a product to which an Airworthiness Directives applies except in accordance with the requirements of that Airworthiness Directives.

Attachment B: Aircraft Maintenance

(g) Aircraft involved in an accident or incident may not be flown in accordance with this authorisation prior to notifying the Authority.

(h) The AOC holder shall impose any further conditions or limitations necessary for safe flight.

(i) This ferry flight authorisation does not constitute an authorisation to operate in the airspace of other States. The operator has to seek clearances from the appropriate authorities of the respective States over which such flight will take place.

9 Maintenance Pages

The inspection, check and overhaul time limits for every aircraft and its engines, component parts, accessories, and appliances shall be as specified in the approved maintenance schedule.

10 Aircraft Weight and Balance Control

Weight and balance control of aircraft operated under this Certificate shall be accomplished in accordance with the approved weight and balance programme manual.

11 Minimum Equipment List

The holder of this Certificate is authorised to use an approved Minimum Equipment List (MEL) for the aircraft operated under this Certificate. The holder shall develop and maintain a comprehensive programme for managing the repair of items listed in the approved MEL. The holder shall include in a document or its Maintenance Control Manual a description of the MEL management programme. The MEL management programme must include at least the following provisions:

(a) A method which provides for tracking the date and when appropriate, the time an item was deferred and subsequently repaired. The method must include a supervisory review of the number of each deferred item.

Attachment B: Aircraft Maintenance

(b) A plan for bringing together parts, maintenance personnel, and aircraft at a specific time and place for repair.

(c) A review of the items deferred because of the unavailability of parts to ensure that a valid back order exists with a firm delivery date.

(d) A description of specific duties and responsibilities by job title of personnel who manage the MEL management programme.

(e) Procedures for controlling the extensions to specified maximum repair intervals, to include the limit of the extensions, documentation of the reason for the extension, and the procedures to be used for authorizing the extensions.

The holder is authorised to use a continuing authorisation to approve extensions to the maximum repair interval for category B and C items as specified in the approved MEL provided the Authority is notified within two working days of any extension approval. The holder is not authorised to approve any extensions to the maximum repair interval for category A and D items as specified in the approved MEL.

12 Prorated Time Authorisation *(if authorised)*

The aircraft listed herein and including its installed engines, component parts, accessories and appliances shall be maintained in accordance with the adjusted hours of time since overhaul as set forth in the document identified as (Document No.), a copy of which is on file with the holder of this Certificate and with the Authority.

Attachment C: Maintenance of Leased Aircraft

OPERATOR NAME:

AOC NUMBER:

MAINTENANCE OF LEASED FOREIGN-REGISTERED AIRCRAFT OPERATED BY CERTIFICATE HOLDER

1 The holder of this Certificate is authorised to maintain the leased foreign registered aircraft listed in the table below, subject to the following conditions and limitations:

Foreign Air Carrier	Aircraft Make/Model Series	Registration Marks	Lease Date	Maintenance Programme Rev No./Date

Table 1

(a) The holder is authorised to adopt the foreign operator's approved maintenance programmes, for the aircraft listed above, as its own programme

(b) Each aircraft listed shall be maintained in accordance with the maintenance programmes identified in (a) above.

(c) Differences and/or exceptions to the maintenance identified above are listed in an appendix to the maintenance programmes identified in the Table 1.

(d) All revisions to the maintenance programmes identified in Table 1 must be approved on an individual basis.

(e) This aircraft lease agreement identified in Table 1 shall not be contrary to the provisions of this Certificate, the holder's maintenance programme, the Air Navigation Order, the Singapore Airworthiness Requirements, and the Air Operator Certificate

Attachment C: Maintenance of Leased Aircraft

(f) All maintenance shall be recorded in accordance with the holder's approved programme (supplemented as necessary to meet the foreign country's continuing

(g) Weight and balance control shall be accomplished in accordance with the holder's approved weight and balance programme.

(h) In the event the aircraft lease agreement between the foreign air carrier and the holder is terminated by either party, this authorisation will terminate effective on the same day.

Attachment D: Aircraft Leasing Operations

OPERATOR NAME:

AOC NUMBER:

AIRCRAFT LEASING OPERATIONS
(Wet Lease)

1 The holder of this Certificate shall conduct all operations authorised under the terms of the lease agreement between _________________ (airline) and __________________ (airline) dated __________ in accordance with the provisions of CAAS operating regulations and rules and the conditions of this Certificate. Such operations are authorised over the routes and areas specified in Appendix 1 to this attachment and to and from the pertinent aerodromes listed in this Appendix, in accordance with the aerodrome operating minima specified. Such operations shall be conducted with ______________________ type aeroplanes and _____________ (airline) flight crews. ______________ (airline) shall be responsible for the operational control of such flights.

2 This authorisation remains in effect until __________________ or until surrendered, suspended, revoked or otherwise terminated by the Director-General of Civil Aviation.

AERODROMES AUTHORISED

AERODROME	*LOCATION*

APPENDIX B

AERODROME OPERATING MINIMA

EFFECTIVE DATE : 15 JULY 2000
REVISION NO : 0 (ISSUE 3)

AERODROME OPERATING MINIMA

1 When specifying Aerodrome Operating Minima as required by the ANO Ninth Schedule Part D, operators should not specify values of runway visual range for Category I operations lower than the appropriate values.

2 Operators may use either the Jeppesen, Aerad or any charts that are approved by the Authority. The minimums specified in these charts should not be lower than that specified by the respective states that they operate into.

3 The following is an example of the RVR related to decision height and approach lighting available for aeroplanes exceeding 5 700 kg MTWA.

	High intensity approach lighting Length available (meters) Day/Night									Low intensity approach lighting available (meters)			
DH (feet)	Over 800	850 – 750	749 – 650	649 – 550	549 – 450	449 – 350	349 – 250	249 – 150	149 – 0	Day All lengths	Over 600	Night 599 - 300	299 - 0
200 - 212	600	600	700	700	800	800	900	1000	1100	1100	900	1000	1100
213 - 237	600	700	700	800	800	900	1000	1100	1200	1200	900	1100	1200
238 - 262	700	700	800	900	900	1000	1100	1200	1300	1300	1000	1200	1300
263 - 287	700	800	900	1000	1000	1100	1200	1300	1400	1400	1100	1300	1400
288 - 325	800	900	1000	1100	1100	1200	1300	1400	1500	1500	1200	1400	1500
326 - 375	900	1000	1100	1200	1200	1300	1400	1400	1500	1500	1200	1400	1500
376 - 425	1000	1100	1200	1300	1300	1400	1500	1500	1500	1500	1300	1500	1500
426 - 475	1100	1200	1300	1400	1400	1500	1500	1500	1500	1500	1400	1500	1500
476 - 525	1200	1300	1400	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
526 - 575	1300	1400	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
576 - 625	1400	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
626 or higher	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500

APPENDIX C

FATIGUE RISK MANAGEMENT FOR FLIGHT AND CABIN CREW

EFFECTIVE DATE : 11 JANUARY 2017
REVISION NO : 32 (ISSUE 3)

Note: Appendix C is structured into:

(a) Section A for operation of ALL flights; and

(b) Section B for additional requirements for ULR (Ultra Long Range) operation.

(c) Attachment 1 Recommended Procedures for Controlled Rest on the Flight Deck

SECTION A OPERATION OF ALL FLIGHTS

DEFINITIONS

(a) **Acclimated**

A crew member is considered acclimated when that crew member has spent 3 consecutive local nights free of duty within a time zone which is 2 hours wide. The crew member will remain acclimated thereafter until a duty period finishes at a place where local time differs by more than 2 hours from that at the point of departure.

(b) **Augmented flight crew**

A flight crew that comprises more than the normal operating flight crew number required to operate the aeroplane and in which each flight crew member can leave their assigned post and be replaced by another appropriately qualified flight crew member for the purpose of in-flight rest.

(c) **Cabin crew member**

A crew member who performs, in the interest of the safety of passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but who shall not act as a flight crew member.

(d) **Day Off**

A day off is an extended rest period to cater to the requirement of managing cumulative fatigue. During a day off, crew shall also be free of all duties.

(e) **Duty**

Any task that flight or cabin crew personnel are required by the operator to perform, including, for example, flight duty, administrative work, training, and positioning.

(f) **Duty period**

A period which starts when flight or cabin crew personnel are required by the operator to report for or to commence a duty and ends when that person is free from all duties.

(g) **Duty with Take-off/s and/or Landing/s within the Window of Circadian Low**

Defined as the duty involving take-off/s and/or landing/s during the period from 0200 to 0459 hours local time (i.e. at the departure or arrival airport).

(h) **Early Start Duty**

An Early Start Duty would be a scheduled departure that commences in the period 0500 to 0659 hours local time.

(i) **Fatigue**

A physiological state of reduced mental or physical performance capability resulting from sleep loss, extended wakefulness, circadian phase, and/or workload (mental and/or physical activity) that can impair a person's alertness and ability to perform safety-related operational duties.

(j) **Fatigue Risk Management System (FRMS**)

A data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles and knowledge as well as operational experience that aims to ensure relevant personnel are performing at adequate levels of alertness.

(k) **Flight crew member**

A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

(l) **Flight duty period**

A period which commences when a crew member is required to report for duty that includes a flight or a series of flights and which finishes when the aeroplane finally comes to rest at the end of the last flight on which he/she is a crew member.

(m) **Flight time**

The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

(n) **Home base**

The location nominated by the operator to the crew member from where the crew member normally starts and ends a duty period or a series of duty periods.

(o) **Late Finish Duty**

A Late Finish Duty would be a scheduled arrival that ends in the period 0100 to 0159 hours local time.

(p) **Local Night**

A period of 8 hours falling between 2200 hours and 0800 hours local time.

(q) **Normal operating flight crew**

The minimum flight deck crew required for public transport operation in compliance with the Air Navigation Order and the Certificate of Airworthiness.

(r) **Operator**

A person, organisation or enterprise engaged in or offering to engage in an aircraft operation.

(s) **Positioning**

The transfer of a crew member from place to place as a passenger on surface or air transport at the behest of the operator.

(t) **Reporting time**

The time at which crew personnel are required by the operator to report for duty.

(u) **Rest period**

A continuous and defined uninterrupted period of time, subsequent to and/or prior to duty, during which flight or cabin crew personnel are free of all duties. In the event that the rest is subsequent to a duty period, the rest period shall commence 1 hour after the crew are free of all duties. Away from base the rest period shall commence either 1 hour after the crew are free of all duties or the time taken to reach the accommodation designated for the rest period, whichever duration is lesser.

(v) **Roster**

A list provided by the operator of the times when a crew member is required to undertake duties. The roster shall include, but not restricted to, the elements of flight time, flight duty period, standby duty, rest period and day off.

(w) **Standby duty**

A defined period of time, at the airport, at the hotel, or at home, during which a crew member is required by the operator to be available to receive an assignment for a specific duty without an intervening rest period.

(x) **Suitable accommodation**

A furnished bedroom which provides for the opportunity of adequate rest/sleep.

(y) **Unforeseen operational circumstance**

An unplanned event, such as aircraft unserviceability, industrial action, operational contingencies and other such unforeseeable occurrences. It excludes circumstances that are known sufficiently in advance such as scheduled charters, planned runway shortening etc.

1 INTRODUCTION

1.1 The Air Navigation Order (ANO) requires that the operator of an aircraft to which the paragraphs apply shall have in place a scheme to manage fatigue risk for flight and cabin crew. This scheme shall be based upon scientific principles and knowledge, with the aim of ensuring that flight and cabin crew members perform at an adequate level of alertness.

1.2 Accordingly, the operator shall establish:

(a) Flight time, flight duty period, duty period and rest period limitations that are in compliance with Appendix C and C1;

(b) A Fatigue Risk Management System (FRMS) in compliance with Appendix C and C2; or

(c) An FRMS in compliance with Appendix C and C2 for part of its operations and the requirements of paragraph 1.2(a) for the remainder of its operations.

2 RESPONSIBILITIES OF THE OPERATOR AND THE CREW

Rationale

2.1 The objective of fatigue risk management regulations is to ensure that flight and cabin crew members remain sufficiently alert so that they can operate to a satisfactory level of performance and safety under all circumstances. The fundamental principle is for every crew member to be adequately rested when he/she begins a flight duty period, and whilst flying, be sufficiently alert to operate to a satisfactory level of performance and safety in all normal and abnormal situations.

The operator's responsibilities

2.2 Duty rosters shall be prepared and published sufficiently in advance to provide crew members the opportunity to plan adequate rest. Consideration shall be given to the cumulative effects of undertaking long duty hours interspersed with minimum rest, and of avoiding rosters that result in the serious disruption of an established pattern of working and sleeping. Rosters should cover a period of at least 4 weeks.

2.3 Flights shall be planned to be completed within the allowable flight duty period taking into account the time necessary for pre-flight duties, the flight and turn-around times, and the nature of the operation.

2.4 In order to avoid any detriment to a crew member's performance, opportunities to consume a meal shall be arranged when the flight duty period exceeds 5 hours.

2.5 The operator shall nominate a home base for each crew member, from where the crew member will normally start and end a duty period or a series of duty periods. The home base shall be assigned with a degree of permanence.

2.6 The operator shall not permit a crew member to operate an aeroplane if it is known or suspected that the crew member is fatigued to the extent that the safety of flight may be adversely affected.

Crew members' responsibilities

2.7 A crew member must not operate an aeroplane when he or she knows that he or she is fatigued or feels unfit to the extent that the safety of flight may be adversely affected.

2.8 Crew members should make best use of the facilities and opportunities that are provided for rest and for the consumption of meals, and they should plan and use their rest periods to ensure that they are fully rested.

3 CONTINUOUS ASSESSMENT OF FATIGUE

3.1 The operator shall establish a mechanism to assess fatigue risk as an ongoing continuous process. This may be part of an existing system or a separate one to cater for fatigue assessment. An analysis of the fatigue assessment is to be submitted to the Authority every 3 months. This submission may be discontinued as and when it is acceptable to the Authority that fatigue risk is being adequately managed by the operator for its operating routes. A similar process shall apply for any new routes that an operator proposes to undertake.

4 USE OF CONTROLLED REST ON THE FLIGHT DECK

4.1 Controlled rest on the flight deck is a fatigue mitigation strategy for flight crews. It shall not be used as a scheduling tool. It is not a substitute for proper preflight sleep or for augmented crew and associated inflight rest, but is intended as a response to unexpected fatigue experienced during flight operations. The recommendations on the procedures for controlled rest on the flight deck are at Attachment 1 to this Appendix.

4.2 The operator shall monitor the use of controlled rest on the flight deck to evaluate whether existing mitigation strategies are adequate.

4.3 The pilot-in-command shall report to the operator when controlled rest on the flight deck has been availed. A report on all such occurrences shall be provided by the operator to the Authority on a regular basis.

4.4 Controlled rest shall only be used on flights of sufficient length such that it does not interfere with required operational duties.

4.5 Controlled rest shall only be used during low workload phases of flight (e.g., during cruise flight).

4.6 Controlled rest shall not be used as a method for extending crew duty periods.

4.7 Procedures for controlled rest on the flight deck shall be published and included in the Operations Manual.

SECTION B ADDITIONAL REQUIREMENTS FOR ULR OPERATIONS

DEFINITIONS

The following definitions shall be applicable to ULR operations:

(a) **Base**

The designated place from where a crew member starts and ends a ULR RDA.

(b) **Duty Flight Crew**

Those members of the flight crew who are on duty in the cockpit.

(c) **In-flight Rest Period**

A period of time within a flight duty period (FDP) which is to give a crew member an opportunity to rest before commencing or recommencing duty as a duty flight crew or cabin crew.

(d) **Outstation**

The destination city away from base to which a crew member operates to as part of a ULR RDA city pair.

(e) **Rostered Duty Assignment (RDA)**

A sequence of FDPs, off-duty periods, standby duty periods, crew positioning and rest periods for which crew are rostered when assigned to operate a ULR flight.

(f) **Ultra Long Range (ULR) flight**

A continuous non-stop flight between the city pairs as indicated in paragraph 7 to this Section.

Note:-

(i) The addition of new city pair/s may be carried out provided that the new destination city is in the same geographic region or, of an equivalent sector length as the indicated city pairs. This will require the approval of the Authority.
(ii) A change in the departure window/s will require the approval of the Authority.
(iii) The use of different aircraft for ULR operations will require the approval of the Authority. Key to the approval will be the inflight rest facilities as detailed in Paragraph 1 below.

1 REST FACILITIES

Flight Crew

1.1 Designated flight crew rest facilities shall be provided on board aircraft. These rest facilities shall comprise not less than two independent rest areas with horizontal bunks and shall provide an environment that is conducive to rest/sleep. Each rest area shall be equipped with a sleeping surface (bunk or equivalent), adequate lighting, air conditioning, independent temperature controls and have noise levels which afford rest and are preferably less than 75 dBA. Humidity enhancement should preferably be provided.

Cabin Crew

1.2 Designated Cabin Crew rest facilities shall be provided on board aircraft. These rest facilities shall provide an environment that is conducive to rest/sleep. The rest area shall be equipped with bunks or horizontal sleeping facilities, adequate lighting, air conditioning, independent temperature controls and have noise levels which afford rest.

1.3 All rest facilities shall be subject to the approval of the Authority.

2 CREW COMPLEMENT AND COMPOSITION

Flight Crew

2.1 Each ULR flight is to be operated by no less than four (4) pilots of whom two (2) must be pilot-in-command qualified. The duty flight crew shall comprise at least two pilots of which one crewmember is pilot-in-command qualified.

2.2 The Operations Manual shall contain specific instructions to ensure that the ULR flight meets the following requirements:

(a) ULR Pre-flight and In-flight Rest Planning

A scheme shall be established to provide guidance to the flight crew on the expected pre-flight preparations and in-flight rest to be taken. Flight crew are to be appropriately rested for the ULR flight. The in-flight rest plan shall provide for at least two (2) rest periods, one of which shall not be less than four (4) hours.

(b) ULR Pre-flight Rostering Requirements

The flight crew shall be acclimatised at base before undertaking a ULR RDA. Immediately prior to commencing the ULR RDA, the crew should be rostered for a rest period of no less than 48 hours, which shall include two (2) local nights, free from flight duties.

(c) ULR Flight Rest Period Away from Base

In the ULR RDA, the scheduled period free of flight duties away from base shall be at least 48 hours, with at least two (2) local nights.

(d) Post ULR RDA Rest At Base Before Embarking on the Next Flight

The ULR flight crew shall be provided with four (4) consecutive local nights of rest free of duty on completion of the ULR RDA, before the crew may be rostered for another ULR flight or other flights.

(e) Travelling Time - Crew Responsibilities

Travelling time, other than time spent on positioning, shall not be counted in the computation of the FDP. Where the usual travelling time from the crew member's home to the normal departure aerodrome is in excess of 1½ hours, the crew member concerned shall make rest arrangements nearer the departure aerodrome, so as to ensure that he has the minimum rest period for a ULR flight as specified in paragraph 2.2 (b).

Note: Where long distances are involved, travelling time from home to departure aerodrome is a factor influencing subsequent onset of fatigue.

Cabin Crew

2.3 Each ULR flight is to be operated by a minimum of 12 cabin crew.

2.4 The required crew complement shall include at least two Crew-in-Charges for each ULR sector with at least one Crew-in-Charge on duty at all times.

Note: The "Crew-in-Charge" refers to a cabin crew member who has completed the Crew-in-Charge (CIC) Training requirements as spelt out in AOCR Chapter 6 paragraph 9.

2.5 The Operations Manual shall contain specific instructions to ensure that the ULR flight meets the following requirements:

(a) ULR Pre-flight and In-Flight Rest Planning

A scheme shall be established to provide guidance to the cabin crew on the expected pre-flight preparations and in-flight rest to be taken. Cabin crew are to be appropriately rested for the ULR flight. With the exception of flights originating from Singapore, when the cabin crew maximum planned FDP is longer by one hour, the cabin crew maximum planned FDP for flights originating from other stations shall be the same as the maximum planned FDP for flight crew.

For ULR FDP of 19 hours or less, cabin crew shall be provided with a minimum in-flight rest period of 4 hours. For ULR FDP greater than 19 hours, cabin crew shall be provided a minimum in-flight rest period of 5 hours.

Note:

(i) When the approved cabin crew rest facilities are not available due to unforeseen circumstances, the minimum inflight rest may be taken in a non-sleeping rest facility. In this case the stipulated ULR

FDP minimum in-flight rest period provided to the cabin crew shall be increased by two hours. The non-availability of cabin crew rest facilities shall only be allowed for one sector in a Crew Operating Pattern.

(ii) The in-flight rest period may be taken either as a single period or broken into multiple rest periods.

(b) ULR Pre-flight Rostering Requirements

Prior to commencing an ULR RDA, the operator shall ensure that the cabin crew are provided with at least a rest period of one calendar day and three (3) local nights at base.

(c) ULR Flight Rest Period Away from Base

In the ULR RDA, the scheduled period free of flying duties away from base shall be at least 48 hours inclusive of two (2) local nights.

(d) Post ULR Rest At Base Before Embarking on the Next Flight

Upon completion of a ULR RDA, the cabin crew shall be provided with a rest period of at least 48 hours inclusive of at least three (3) consecutive local nights.

3 DISCRETION TO EXTEND A ULR FDP IN EVENT OF FLIGHT DISRUPTIONS

3.1 In the event of a flight disruption, the pilot-in-command of the ULR flight, may, at his discretion and after taking into account the circumstances of the other crew members of that ULR flight, extend a flight duty period of the ULR flight for up to three (3) hours.

3.2 Whenever such discretion is exercised, a report shall be submitted to the Authority by the operator within 30 days if the normal limitations are exceeded by 2 hours from base or 1 hour from outstation. The report should include date, time, aircraft, crew, details of planned and achieved schedules and the report of the circumstances. Authorised officers may examine such reports from time to time.

4 FLIGHT DELAYS AND DISRUPTIONS

4.1 Flight delays and disruptions may occasionally cause the flight departure to be outside the permitted departure window. In such situations, the flight may be permitted to continue provided the crewing and flight crew Flight Time Limits have been appropriately managed to cater to the requirements for the amended departure time.

5 STANDBY FLIGHT CREW

5.1 At base, the standby flight crew for a ULR RDA shall be rostered such that the standby flight crew meet the requirements specified in paragraph 2.2 (b) of Section B of this Appendix.

5.2 At outstation, the standby flight crew may be called to operate an ULR FDP after achieving a rest period of at least 24 hours including one local night provided the Pilot-in-command and one other crew member have met the rest requirement of paragraph 2.2 (c). The standby flight crew if activated for the ULR FDP will be deemed to have completed a ULR RDA and shall be given the rest provided in paragraph 2.2 (d).

6 DISCRETION TO REDUCE A REST PERIOD AT LAYOVER

Flight Crew

6.1 The following conditions shall apply to the exercise of discretion to reduce a rest period for a ULR flight.

(a) The exercise of discretion to reduce a rest period shall be treated as an exception. If exercised, the rest taken in the accommodation should be of at least 24 hours duration and to include one local night;

(b) Such discretion shall not be routinely exercised.

6.2 Whenever such discretion is exercised, a report shall be submitted to the Authority by the operator within 30 days if the normal limitations are exceeded by 2 hours from base or 1 hour from outstation. The report should include date, time, aircraft, crew, details of planned and achieved schedules and the report of the circumstances. Authorised officers may examine such reports from time to time.

Cabin Crew

6.3 The following conditions shall apply to the Crew-in-Charge when exercising the discretion to reduce a rest period for a ULR flight on behalf of the crew, or to an individual exercising the discretion on his own behalf:

(a) The exercise of discretion to reduce a rest period shall be treated as an exception. If exercised, the rest taken in the accommodation shall be of at least 24 hours duration and shall include one local night; and

(b) Such discretion shall not be routinely exercised.

6.4 Whenever such discretion is exercised, a report shall be submitted to the Authority by the operator within 30 days if the normal limitations are exceeded by 2 hours from base or 1 hour from outstation. The report should include date, time, aircraft, crew, details of planned and achieved schedules and the report of the circumstances. Authorised officers may examine such reports from time to time.

7 ULTRA LONG RANGE OPERATIONS

7.1 The current approved windows/city pairs for ULR operations are as follows:

ULTRA LONG RANGE FLIGHTS BETWEEN THE CITY PAIRS

1. SINGAPORE AND LOS ANGELES
(a) Departing Singapore: 0800 hrs to 1200 hrs OR 1600 hrs to 2000 hrs
(b) Departing Los Angeles: 1200 hrs to 1600 hrs OR 2000 hrs to 0300 hrs

2. SINGAPORE AND NEW YORK
(a) Departing Singapore 1010 hrs to 1410 hrs OR 2200 hrs to 0200 hrs
(b) Departing NYC 0930 hrs to 1330 hrs OR 2300 hrs to 0300 hrs

Note:- All time are local times.

Attachment 1 to Appendix C Recommended Procedures for Controlled Rest on the Flight Deck

RECOMMENDED PROCEDURES FOR CONTROLLED REST ON THE FLIGHT DECK

Note: this list is not exhaustive, nor are all of these procedures necessarily required.

(a) Only one pilot may take controlled rest at a time in his seat. The harness should be used and the seat positioned to minimise unintentional interference with the controls.

(b) The autopilot and auto-thrust systems (if available) should be operational.

(c) Any routine system or operational intervention which would normally require a cross check, should be planned to occur outside controlled rest periods.

(d) Controlled rest on the flight deck may be used at the discretion of the captain to manage both unexpected fatigue and to reduce the risk of fatigue during higher workload periods later in the flight.

(e) It should be clearly established who will take rest, and when it will be taken. If the pilot in command requires, the rest may be terminated at any time.

(f) The pilot in command should define criteria for when his/her rest should be interrupted.

(g) Hand-over of duties and wake-up arrangements should be reviewed.

(h) Flight crews should only use controlled rest if they are familiar with the published procedures.

(i) A third crewmember (not necessarily a pilot) may be involved to monitor controlled flight deck rest. This may include a planned wake-up call, a visit to be scheduled just after the planned rest period ends, or a third crewmember on the flight deck throughout controlled rest.

(j) The controlled rest period should be no longer than 40 minutes, to minimise the risk of sleep inertia on awakening.

(k) Controlled rest should only be utilised during the cruise period from the top of climb to 20 minutes before the planned top of descent. This is to minimise the risk of sleep inertia.

(l) A short period of time should be allowed for rest preparation. This should include an operational briefing, completion of tasks in progress, and attention to any physiological needs of either crew member.

(m) During controlled rest, the non-resting pilot must perform the duties of the pilot flying and the pilot monitoring, be able to exercise control of the aircraft at all times and maintain situational awareness. The non-resting pilot cannot leave his/her seat for any reason, including physiological breaks.

(n) Aids such as eye shades, neck supports, ear plugs, etc., should be permitted for the resting pilot.

APPENDIX C 1
FATIGUE RISK MANAGEMENT – BASIC REQUIREMENTS

EFFECTIVE DATE : 8 JULY 2016
REVISION NO : 31 (ISSUE 3)

1 TYPES OF FATIGUE

1.1 Two types of fatigue shall be taken into account, namely, transient fatigue and cumulative fatigue. Transient fatigue may be described as fatigue that is dispelled by a single sufficient period of rest or sleep. Cumulative fatigue occurs after incomplete recovery from transient fatigue over a period of time.

1.2 Limitations based upon these provisions will provide safeguards against both kinds of fatigue because they will recognise:

(a) the necessity to limit flight duty periods with the aim of preventing both kinds of fatigue;

(b) the necessity to limit the duty period where additional tasks are performed immediately prior to a flight or at intermediate points during a series of flights in such a way as to prevent transient fatigue;

(c) the necessity to limit total duty time and flight time over specified periods, in order to prevent cumulative fatigue;

(d) the necessity to provide crew members with adequate rest opportunity to recover from fatigue before commencement of the next flight duty period; and provision of extended rest periods (Days Off) to recover from cumulative fatigue

(e) the necessity of taking into account other related tasks the crew member may be required to perform in order to guard particularly against cumulative fatigue.

2 DUTY WITH TAKE-OFF/S AND/OR LANDING/S WITHIN THE WINDOW OF CIRCADIAN LOW

2.1 Prior to a planned / rostered series of flight duty periods that encompass an early start, a late finish or a take-off / landing in the window of circadian low, crew shall be provided with a rest period of 24 hours inclusive of a local night. The flight duty period that then encompasses an early start, a late finish or a take-off / landing in the window of circadian low shall earn the appropriate minimum rest period prior to the next flight duty period that encompasses an early start, a late finish or a take-off / landing in the window of circadian low. After such consecutive flight duty periods that include an early start, a late finish or a take-off / landing in the window of circadian low, crew shall have a 24 hour period free of all duties inclusive of a local night before the next flight duty period that encompasses an early start, a late finish or a take-off / landing in the window of circadian low. If the flight does not include an early start, a late finish or a take-off / landing in the window of circadian low, only the appropriate minimum rest shall apply.

Note: The rest period of 24 hours inclusive of a local night may be part of the crew's day off.

3 FLIGHT DUTY PERIOD (FDP)

3.1 A flight duty period does not include the period of travelling time from home to the point of reporting for duty. It is the responsibility of the crew member to report for duty in an adequately rested condition.

3.2 Where the usual travelling time from the crew member's home to the normal departure aerodrome is in excess of 1 ½ hours, the crew member concerned should consider making arrangements nearer the departure aerodrome, so that he has a minimum of 24 hours inclusive of a local night at this rest facility prior to reporting for a flight duty period.

3.3 The time spent on positioning at the behest of the operator is part of a duty period but it will become part of a flight duty period when this time immediately precedes (i.e. without an intervening rest period) a flight duty period in which that person participates as a crew member.

3.4 In the planning of Duty periods and Flight duty periods, the operator shall consider all relevant factors, which include:

(a) the number and direction of time zones crossed;
(b) the time at which a flight duty period is scheduled to begin;
(c) the number of planned and/or actual sectors within the flight duty period;
(d) the pattern of working and sleeping relative to the circadian rhythm, or 24-hour physiological cycle of the crew;
(e) the scheduling of days off;
(f) the sequence of early reporting times and late releases from duty;
(g) the mixing of early/late/night duties;
(h) the flight operation characteristics;
(i) the allocation of work patterns which avoid such undesirable practices such as alternating day/night duties or the positioning of crew such that a serious disruption of established sleep/work patterns occur;
(j) the planning days off and notifying crew well in advance; and
(k) the basic roster concepts which ensure adequate rest prior to flight.

3.5 When a crew member is required to report for duty in advance of the stipulated report time for a scheduled flight, to carry out a task at the behest of the employer, then the time spent on that task shall be part of the FDP.

4 TRAINING

4.1 Training shall be provided for Flight and Cabin crew as well as for Rostering Staff (includes any operational personnel looking after crew scheduling and activation) and shall include guidance on the effects of sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity) that can impair a crew member's alertness and ability to safely operate an aircraft or perform safety-related duties and also include all relevant factors such as: the number and direction of time zones crossed; the time at which a flight duty period is scheduled to begin; the number of planned and/or actual sectors within the flight duty period; the pattern of working and sleeping relative to the circadian rhythm, or 24-hour physiological cycle of the crew; the scheduling of days off; the sequence of early reporting times and late releases from duty; mixing early/late/night duties; and flight operation characteristics.

5 REQUIREMENTS ON ACCOMMODATION

5.1 Suitable accommodation on the ground, when away from home base, shall be provided for rest in order to allow for effective recovery.

5.2 Travelling time spent by a crew member in transit between the place of rest and the place of reporting for duty is not counted as duty, even though it is a factor contributing to fatigue. Excessive travelling time undertaken immediately before commencing a flight duty period could therefore detract from a crew member's ability to counter fatigue arising whilst on duty, and should therefore be taken into account when deciding where pre-flight rest should be taken.

5.3 Where the usual travelling time from the crew member's home to the normal departure aerodrome is in excess of 1 ½ hours, the crew member concerned should consider making arrangements nearer the departure aerodrome, so that he has a minimum of 24 hours inclusive of a local night at this rest facility arrangement prior to reporting for a flight duty period.

6 MINIMUM REST PERIOD

6.1 The minimum rest period subsequent to and/or prior to a scheduled flight duty period shall be:

(a) not less than 10 hours if it includes a local night;

(b) not less than 12 hours if it does not include a local night;

(c) at least as long as the preceding duty rounded to the next whole hour, if this has exceeded 10 hours and up to 16 hours;

(d) If the preceding duty exceeded 16 hours, the rest period shall be 24 hours and shall include a local night.

6.2 Minimum rest periods may be reduced in unforeseen operational circumstances by no more than 2 hours only at the discretion of the pilot-in-command. In situations where a local night would have been required, this requirement shall remain.

7 DAY OFF

7.1 In a day off, a crew member shall have 34 hours free of all duties including a local night, commencing 1 hour after the crew member completes a duty period. If the crew member is away from base, the day off shall commence either 1 hour after the crew member are free of all duties or the time taken to reach the accommodation designated for the day off, whichever is lesser.

7.2 A planned minimum rest period may be included as part of a day off.

7.3 Each subsequent day off shall be a period of 24 hours and shall include a local night.

7.4 Crew members:

(a) shall not work more than 7 consecutive days between days off;

(b) shall be rostered to have two days off every 2 consecutive weeks. Where these two days off are rostered consecutively, the total time off will be 58 hours and when not rostered consecutively, each separate day off will be of 34 hours duration;

(c) shall have eight days off every 4 consecutive weeks. A minimum of 6 days off in a consecutive 4 week period is permissible provided the shortfall of the remaining days off has been / is made good in the preceding or following consecutive 4 week period.

7.5 When a crew member has been away from home base for any period of 7 days or more, a period of 82 hours, including 3 local nights shall be provided to re-acclimate the crew to home base before the start of the next flight duty period.

8 STANDBY DUTY

8.1 The start time and end time of standby shall be defined and the maximum length of any standby shall not exceed 18 hours for flight crew and 24 hours for cabin crew.

8.2 Where airport standby, with adequate rest facilities provided, is immediately followed by a flight duty period, the airport standby shall be taken into account to calculate the minimum rest preceding a subsequent flight duty period. Where the airport standby is without adequate rest facilities, the period of standby shall form part of the FDP.

8.3 A rest facility at an airport shall as a minimum, comprise an independent, screened off rest area with a horizontal sleeping surface and shall provide an environment that is conducive to rest/sleep.

8.4 When crew personnel are required to be on standby at an accommodation arranged by the operator, then adequate rest facilities should be provided.

8.5 If a crew member is called out from standby, the standby duty shall cease at the time when the crew member is activated for duty. The duty period shall commence when that individual reports for duty at the designated reporting point

8.6 Time spent on standby at home or in local accommodation shall be factorised for the purpose of determining cumulative duty limits, at 20 percent of the total period of standby.

9 CREW REPORTING TIME

9.1 Crew report times shall realistically reflect the time required to complete all assigned pre-flight duties, and a minimum of 90 minutes is to be allowed for the completion of preflight duties and post flight checks and records. The time for completion of preflight requirements shall be a minimum of 1 hour. For record purposes, the pre-flight report time shall count as flight duty, and the post-flight allowance shall count as duty.

10 POSITIONING

10.1 All time spent positioning counts as duty, and positioning followed by operating without an intervening rest period also counts for computation towards flying duty period. However, positioning is not counted as an operating sector when planning or calculating a flight duty period.

11 MIXED SIMULATOR AND AIRCRAFT FLYING

11.1 When a flight crew member flies in the simulator, either undergoing or conducting a check or training flight (session), and then within the same duty period flies as a flight crew member on a public transport flight / training and/or test flight, all the time spent in the simulator is counted in full towards the subsequent FDP.

11.2 Simulator flying itself does not count as a sector, but the FDP allowable is calculated from the report time of the simulator detail.

12 DELAYED REPORTING TIME

12.1 When a crew member is informed of a delay to the reporting time before leaving the place of rest, the FDP shall be calculated as follows:

(a) When the delay is less than 4 hours, the maximum allowed FDP shall be based on the original report time but the FDP shall start at the actual report time.

(b) Where the delay is 4 hours or more, the maximum allowed FDP shall be based on the actual report time but the FDP shall start 4 hours after the original report time.

(c) When the operator informs a crew member before leaving the place of rest of a delay in reporting time of 10 hours or more ahead and that crew member is not further disturbed by the operator until a mutually agreed hour, then that elapsed time is considered a continuation of the rest period.

13 LIMITS ON FLIGHT TIME

13.1 Pursuant to ANO Paragraph 55(1), the maximum number of flying hours a flight crew member can perform is:

(a) 100 hours in any consecutive 28 days
(b) 1000 hours in any consecutive 12 months

14 LIMITS ON DUTY HOURS

14.1 Flight crew duty hours shall not exceed:

(a) 90 hours in any consecutive 14 days; and
(b) 180 hours in any consecutive 28 days

14.2 Cabin crew duty hours shall not exceed:

(a) 100 hours in any consecutive 14 days; and
(b) 200 hours in any consecutive 28 days

15 LIMITS ON FLIGHT DUTY PERIOD

15.1 For Flight Duty Period limitations, the crew complement and the extent to which the various tasks to be performed can be divided among the crew members should be taken into account; In the case where additional crew members are carried and facilities in the aeroplane are such that a crew member can obtain recuperative rest, planned flight duty periods could be extended.

16 EXTENSION OF FLIGHT DUTY PERIOD

16.1 Flight Duty Periods may be extended in unforeseen operational circumstances by no more than 3 hours, only at the discretion of the pilot-in-command. Before exercising this discretion, a fatigue risk assessment shall be carried out and the pilot-in-command shall be satisfied that all members of the crew required to operate the aeroplane consider themselves fit to do so. This extension of the FDP may be carried out provided:

(a) the safety of the flight will not be prejudiced; and

(b) the extended Flight Duty Period shall not exceed by more than three hours the maximum permitted Flight Duty Period except in an emergency.

Note: An emergency in respect of an extension of a flight duty is a situation which, in the judgment of the pilot-in-command, presents a serious risk to health or safety.

16.2 The pilot-in-command shall report to the operator the use of discretion to extend duty or reduce rest by more than 2 hours from the normal limitations. The operator shall in turn report to the Authority when such discretion is exercised within 30 days.

The report should include date, time, aircraft, crew, details of planned and achieved schedules and the report of the circumstances. Authorised officers may examine such reports from time to time.

16.3 If discretion has to be applied for similar reasons on more than 20 percent of occasions when a particular route or route pattern is flown, it is likely that the intention of this fatigue management requirement is not being met. Arrangements shall be made to review the schedule or the crewing management so as to reduce the frequency at which such events occur.

17 LIMITATIONS ON FLIGHT DUTY PERIODS - FLIGHT CREW

17.1 The maximum permitted FDP (in hours) shall be in accordance with:

(a) Table A or B in the case of an aeroplane with a normal flight crew complement of 2 pilots; or

(b) Table C in the case of a single pilot aeroplane; or

(c) Table D in the case of a helicopter.

18 MAXIMUM PERMITTED FDP - FLIGHT CREW

18.1 Table A shall apply when the FDP starts at a place where the flight crew member is acclimated to local time, while Table B shall apply when the FDP starts at a place where the flight crew member is not acclimated to local time.

18.2 The maximum permitted FDP may be adjusted by applying the additional limits under Paragraph 19 where applicable.

Table A: Maximum Permitted FDP for Flight Crew (Acclimated to local time)

	Local time of start	Total sectors to be flown							
		1	2	3	4	5	6	7	8 or more
Maximum FDP (hours)	0600-0759	13	12 ¼	11 ½	10 ¾	10	9 ¼	9	9
	0800-1459	14	13 ¼	12 ½	11 ¾	11	10 ¼	9 ½	9
	1500-2159	13	12 ¼	11 ½	10 ¾	10	9 ¼	9	9
	2200-0559	11	10 ¼	9 ½	9	9	9	9	9

Table B: Maximum Permitted FDP for Flight Crew (Not acclimated to local time)

Total sectors to be flown	1	2	3	4	5	6 or more
Maximum FDP (hours)	12 ½	12	11	10 ½	10	9

Table C: Maximum Permitted FDP for Flight Crew (Single pilot aeroplanes)

	Total sectors to be flown				
Local time of start	Up to 4	5	6	7	8 or more
0600-0759	10	9 ¼	8 ½	8	8
0800-1459	11	10 ¼	9 ½	8 ¾	8
1500-2159	10	9 ¼	8 ½	8	8
2200-0559	9	8 ¼	8	8	8

Table D: Maximum Permitted FDP for Flight Crew (Helicopters)

Local time of start	Single Pilot		Two Pilots	
	Maximum FDP	Maximum Flying	Maximum FDP	Maximum Flying
0600-0759	9	6	11	8
0800-1459	10	7	12	9
1500-2159	9	6	11	8
2200-0559	8	5	10	7

19 ADDITIONAL LIMIT ON TWO-CREW LONG SECTORS

19.1 When an aeroplane flight crew consists only of two pilots, the FDP calculated from Table A or B will be adjusted by counting long sectors as more than one sector in the following manner:

Single sector length (block time) as	Count as (sectors)	
	Table A	Table B
Over 7 but not over 9 hours	2	3
Over 9 but not over 11 hours	3	4
Over 11 hours	4	5

20 MAXIMUM PERMITTED FLIGHT DUTY PERIOD WITH AUGMENTED PILOTS IN THE FLIGHT CREW

20.1 The amount by which the basic flight duty period limitations may be extended shall be determined by the composition and number of pilots carried to provide in-flight relief and the quality of rest facilities provided. A sensible balance shall be kept between the division of in-flight duty and rest.

20.2 The maximum permitted Flight Duty Period may be extended when the Normal Flight Crew complement is augmented with pilots according to the following:

(a) Up to a maximum FDP of 15 hours if augmented with one pilot (each pilot can leave his assigned post for the purpose of in-flight rest and be replaced by another appropriately qualified pilot) and appropriate rest facilities are available for one pilot

(b) Up to a maximum FDP of 18 hours if augmented with two pilots (up to two pilots can leave their assigned post at the same time for the purpose of in-flight rest and be replaced by two other appropriately qualified pilots) and appropriate rest facilities are available for two pilots

Note: The requirements for ULR flights are in Appendix C.

20.3 Despite paragraph 20.2 no extension of the Flight Duty Period will be permitted even with pilots, if no rest facilities for the required number if pilots are available.

21 FLIGHT DUTY PERIOD FOR CABIN CREW

21.1 The operator may require a cabin crew member to report at a time that is earlier than his/her scheduled reporting time for pre-flight briefing provided that the earlier time is not more than 60 minutes before the reporting time for flight crew.

21.1A The maximum Flight Duty Period of a cabin crew member is the same as that applicable to a flight crew member as specified in paragraph 18 or 19, as the case may be, plus the difference in reporting time provided in paragraph 21.1.

21.2 The number of the cabin crew should be determined taking into account the rest facilities provided and other parameters linked to the operation of the flight.

21.3 The operator may assign a cabin crew member a Flight Duty Period of more than 14 hours, excluding the difference in reporting time between the flight crew and cabin crew as described in paragraph 21.1, provided that:

(a) horizontal rest facilities are provided on board the flight;

(b) the cabin crew member has a minimum in-flight rest period of 3 hours for a Flight Duty Period of up to 16 hours and 4 hours for a Flight Duty Period of up to 19 hours; and

(c) the division of duty and rest is fairly distributed among all cabin crew members on a flight.

21.4 Despite paragraph 21.3, the operator shall not assign any cabin crew member a Flight Duty Period of more than 19 hours, excluding the difference in reporting time between the flight crew and cabin crew as described in paragraph 21.1.

21.5 If horizontal rest facilities are not available due to unforeseen circumstances, and the in-flight rest has to be taken in a suitable seat, the minimum in-flight rest period specified above shall be increased by 1 hour.

Note: The requirements for ULR flights are in Appendix C.

22 DELAY(S) / DISRUPTION(S) IMPACTING ON ROSTERED DAY/S OFF

22.1 The operator shall plan flights in a realistic manner. While flights are planned to be completed within the maximum Flight Duty Period, it is recognised that on occasion a planned flight will experience delay(s) and/or disruption(s) due to unforeseen circumstances, which may impact on the ensuing rostered day off. In the situation where a flight is disrupted / delayed due to unforeseen circumstances, the ensuing day off may be reduced by 4 hours provided the shortfall is made up in the next allocation of a day off and be in compliance with paragraph 7.4. The minimum rest period following a delayed or disrupted flight shall be according to the Flight Duty Period achieved including the period of delay/disruption.

23 APPROPRIATE IN-FLIGHT REST FACILITY FOR FLIGHT CREW

23.1 The composition and number of flight crew members carried to provide in-flight relief and the quality of rest facilities provided should determine the amount by which the basic flight duty period limitations may be extended.

23.2 An in-flight rest facility should preferably be a designated rest area with a horizontal rest facility. Where a horizontal rest facility (bunk) cannot be provided for in-flight rest, the operator shall seek approval of the rest facility from the Authority.

23.2.1 For long haul flights, operated with Augmented Flight Crew, particularly those in which the FDP (from the point of departure) includes the time span from 0100 to 0659 (local time), a horizontal rest facility shall be provided.

23.2.2 In the situation where flights may possibly be conducted with a Normal Flight Crew complement but the operator opt to use Augmented Flight Crew for the purpose of managing fatigue risk, a suitable reclining seat, for in-flight rest, may be used.

Note: The extension of the maximum FDP as stated in paragraph 16, when applied to paragraph 20 shall be dependent on the quality of the rest facility/ies provided.

24 RECORDS

24.1 To enable the operator to ascertain that the fatigue management scheme is functioning as intended and as approved, records of the duties performed and rest periods achieved shall be kept for at least 12 months.

24.2 The operator shall ensure that these records include, but not limited to:

(a) For each flight crew member:
  - (i) the start, duration and end of each flight duty period;
  - (ii) the start, duration and end of each duty period;
  - (iii) rest periods; days off and
  - (iv) flight time.

(b) For each cabin crew member:
  - (i) the start, duration and end of each flight duty period;
  - (ii) the start, duration and end of each duty period; and
  - (iii) rest periods and days off.

24.3 The operator shall also keep records of occasions when a pilot-in-command has exercised his discretion to extend a duty period or reduce a rest period.

24.4 Flight and cabin crew members shall maintain a personal record of their duty, flight duty period and rest times.

APPENDIX C 2
FATIGUE RISK MANAGEMENT SYSTEM (FRMS)

EFFECTIVE DATE : 28 JUNE 2013
REVISION NO : 24 (ISSUE 3)

1 FATIGUE RISK MANAGEMENT SYSTEM (FRMS)

1.1 FRMS is a data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles and knowledge as well as operational experience, and aims to ensure relevant personnel are performing at adequate levels of alertness.

2 TYPES OF FATIGUE

2.1 Two types of fatigue shall be taken into account, namely, transient fatigue and cumulative fatigue. Transient fatigue may be described as fatigue that is dispelled by a single sufficient period of rest or sleep. Cumulative fatigue occurs after incomplete recovery from transient fatigue over a period of time.

3 FATIGUE RISK MANAGEMENT SYSTEM (FRMS)

3.1 The operator's FRMS shall be approved by the Authority before it may take the place of any or all of the basic fatigue management regulations described in Appendix C and C1. An approved FRMS shall provide a level of safety equivalent to, or better than, the basic fatigue management regulations.

3.2 As part of this process, the operator shall:

(a) establish maximum values for flight times and/or flight duty periods(s) and duty period(s), and minimum values for rest periods. These values shall be based upon scientific principles and knowledge, subject to safety assurance processes, and acceptable to the Authority;

(b) be required to mandate a decrease in maximum values and an increase in minimum values in the event that the operator's data indicates these values are too high or too low, respectively; and

(c) request the Authority to approve any increase in maximum values or decrease in minimum values. This shall be done only after evaluating the operator's justification for such changes, based on accumulated FRMS experience and fatigue-related data.

3.3 The operator shall, as a minimum:

(a) incorporate scientific principles and knowledge within the FRMS;

(b) identify fatigue-related safety hazards and the resulting risks on an ongoing basis;

(c) ensure that remedial actions, necessary to effectively mitigate the risks associated with the hazards, are implemented promptly;

(d) provide for continuous monitoring and regular assessment of the mitigation of fatigue risks achieved by such actions; and

(e) provide for continuous improvement to the overall performance of the FRMS.

3.4 The operator shall maintain records for all its flight and cabin crew members of flight time, flight duty periods, duty periods, and rest periods for a period of at least 12 months.

Note : Where the operator has an FRMS, it shall be integrated with the operator's SMS.

4 FATIGUE RISK MANAGEMENT SYSTEM REQUIREMENTS

4.1 A Fatigue Risk Management System (FRMS) established in accordance with this Appendix shall contain, at a minimum the following:

(a) FRMS policy and documentation;

(b) Fatigue risk management processes;

(c) FRMS safety assurance processes; and

(d) FRMS promotion processes.

4.2 FRMS policy and documentation

4.2.1 FRMS policy

4.2.1.1 The operator shall define its FRMS policy, with all elements of the FRMS clearly identified.

4.2.1.2 The policy shall require that the scope of FRMS operations be clearly defined in the operations manual.

4.1.2.3 The policy shall

(a) reflect the shared responsibility of management, flight and cabin crews, and other involved personnel;

(b) clearly state the safety objectives of the FRMS;

(c) be signed by the accountable manager of the organisation;

(d) be communicated, with visible endorsement, to all the relevant areas and levels of the organisation;

(e) declare management commitment to effective safety reporting;

(f) declare management commitment to the provision of adequate resources for the FRMS;

(g) declare management commitment to continuous improvement of the FRMS;

(h) require that clear lines of accountability for management, flight and cabin crews, and all other involved personnel are identified; and

(i) require periodic reviews to ensure it remains relevant and appropriate.

4.2.2 **FRMS documentation**

The operator shall develop and keep current FRMS documentation that describes and records

(a) FRMS policy and objectives;

(b) FRMS processes and procedures;

(c) accountabilities, responsibilities and authorities for these processes and procedures;

(d) mechanisms for ongoing involvement of management, flight and cabin crew members, and all other involved personnel;

(e) FRMS training programmes, training requirements and attendance records;

(f) scheduled and actual flight times, duty periods and rest periods with significant deviations and reasons for deviations noted; and

(g) FRMS outputs including findings from collected data, recommendations, and actions taken.

4.3 Fatigue risk management processes

4.3.1 **Identification of hazards**

4.3.1.1 The operator shall develop and maintain the following three fundamental and documented processes for fatigue hazard identification:

(a) *Predictive*

A predictive process to identify fatigue hazards by examining crew scheduling and taking into account factors known to affect sleep and fatigue and their effects on performance. Methods of examination may include but are not limited to:

(i) operator or industry operational experience and data collected on similar types of operations;
(ii) evidence-based scheduling practices; and
(iii) bio-mathematical models.

(b) Proactive

A proactive process to identify fatigue hazards within current flight operations. Methods of examination may include but are not limited to:

(i) self-reporting of fatigue risks;
(ii) crew fatigue surveys;
(iii) relevant flight and cabin crew performance data;
(iv) available safety databases and scientific studies; and
(v) analysis of planned versus actual time worked.

(c) Reactive

A reactive process to identify the contribution of fatigue hazards to reports and events associated with potential negative safety consequences in order to determine how the impact of fatigue could have been minimised. At a minimum, the process shall be triggered by any of the following:

(i) fatigue reports;
(ii) confidential reports;
(iii) audit reports;
(iv) incidents; and
(v) flight data analysis events.

4.3.2 **Risk assessment**

4.3.2.1 The operator shall develop and implement risk assessment procedures that determine the probability and potential severity of fatigue-related events and identify when the associated risks require mitigation.

4.3.2.2 The risk assessment procedures shall include the review of identified hazards and link them to:

(a) operational processes;
(b) their probability;
(c) possible consequences; and
(d) the effectiveness of existing safety barriers and controls.

4.3.3 **Risk mitigation**

4.3.3.1 The operator shall develop and implement risk mitigation procedures to:

(a) select the appropriate mitigation strategies;
(b) implement the mitigation strategies; and
(c) monitor the strategies' implementation and effectiveness.

4.3.4 **FRMS safety assurance processes**

4.3.4.1 The operator shall develop and maintain FRMS safety assurance processes to:

(a) provide for continuous FRMS performance monitoring, analysis of trends, and measurement to validate the effectiveness of the fatigue safety risk controls. The sources of data may include, but are not limited to:

(i) hazard reporting and investigations;
(ii) audits and surveys; and
(iii) reviews and fatigue studies;

(b) provide a formal process for the management of change which shall include but is not limited to:

(i) identification of changes in the operational environment that may affect FRMS;
(ii) identification of changes within the organisation that may affect FRMS; and
(iii) consideration of available tools which could be used to maintain or improve FRMS performance prior to implementing changes; and

(c) provide for the continuous improvement of the FRMS. This shall include but is not limited to:

(i) the elimination and/or modification of risk controls have had unintended consequences or that are no longer needed due to changes in the operational or organisational environment;

(ii) routine evaluations of facilities, equipment, documentation and procedures; and

(iii) the determination of the need to introduce new processes and procedures to mitigate emerging fatigue-related risks.

4.4 **FRMS promotion processes**

4.4.1 FRMS promotion processes support the ongoing development of the FRMS, the continuous improvement of its overall performance, and attainment of optimum safety levels. The following shall be established and implemented by the operator as part of its FRMS:

(a) training programmes to ensure competency commensurate with the roles and responsibilities of management, flight and cabin crew, and all other involved personnel under the planned FRMS; and

(b) an effective FRMS communication plan that:

(i) explains FRMS policies, procedures and responsibilities to all relevant stakeholders; and

(ii) describes communication channels used to gather and disseminate FRMS-related information.

APPENDIX D
ALTIMETER PROCEDURES

EFFECTIVE DATE : 28 JUNE 2013
REVISION NO : 24 (ISSUE 3)

ALTIMETER PROCEDURES

1 This Appendix is intended to assist the operator in preparing instructions relating to the proper use of all altimeters on the aircraft flight deck. It applies mainly to multi-crew operations, but can, with few exceptions, be applied to single-pilot operations. It is for the operator to determine its own policy in using QNH or QFE for landing; this policy should be reflected in the instructions and procedures which should be clear, positive and consistent.

2 Instructions should cover all stages of the operation of the aircraft, both before and during flight. A company's basic policy should be accurately reflected in its check lists, and take account of the following:

2.1 Pre-flight serviceability tests:

2.2 The settings to be made on each altimeter on the flight deck prior to take-off and at each stage of the flight:

2.3 During the approach phase a check of airfield height is required; a cross check of airfield height against the difference between the QFE and QNH settings should also be made when QFE is used for landing.

3 Additional instructions should be included on the following (where appropriate to the basic policy):

3.1 The procedure for indicating decision heights for landing; this might range from a figure in the navigation log to altimeter bugs and/or separate "landing data cards".

3.2 The settings and procedures to be adopted when QFE is not available or cannot for some reason be used by an aircraft when a company's normal policy is to use QFE.

3.3 The manner of checking and of the use of any non-pressure altimeter(s).

3.4 The provision of appropriate procedures if an altimeter becomes unserviceable in flight, and also the conditions to be met if this is a pre-flight allowable deficiency.

3.5 The manner of setting the altimeters, when the take-off or landing is carried out from the co-pilot's seat. Unless there are good reasons for doing otherwise, operators should not vary their normal policy.

Note: Neither in the policy statement nor in the check lists is it sufficient for the word "set" to be used. The setting required by the operator should be clearly stated in respect of each altimeter concerned, including any "standby" altimeter.

4 The following matters should also be covered in the operations manual:

4.1 The calls to be made by the monitoring pilots during instrument approaches, e.g. at the outer marker and at 100 ft above decision height or thereabouts. In the case of Category II and III weather minima approaches, the appropriate calls and responses will need to be stated in some detail.

4.2 Correct reporting of height changes to ATC: it should be particularly noted that the report should not be made before arriving at or before leaving the particular altitude/level.

4.3 Provision of one altimeter to be set to an appropriate QNH setting when flying at or near to the Minima Safe Altitude (particularly for unpressurised single crew aircraft) would be a prudent precaution.

4.4 Cross checking of altimeters at appropriate intervals by all flight deck crew during climb and descent.

4.5 Instructions requiring the co-pilot to advise the pilot-in-command that he/she is approaching the assigned altitude or level.

4.6 An instruction requiring the crew to inform ATC, prior to commencement of a radar approach, of the intention to use QNH settings throughout the procedure.

4.7 Procedures for use of Altitude Alert Systems, if fitted.

APPENDIX E
EN-ROUTE PERFORMANCE – DRIFT DOWN

EFFECTIVE DATE : 15 JULY 2000
REVISION NO : 0 (ISSUE 3)

EN-ROUTE PERFORMANCE - 'DRIFT-DOWN'

1 Operators should be aware of the routes on which the en-route performance of their aircraft, following the failure of one or two engines, will be critical and should include instructions relating to such routes in their operations manuals in order to reduce the risks which could arise from indecision or error in the case of engine failure.

2 In the case of critical routes it may, in some cases, be possible to regulate the aircraft's planned take-off weight to such an extent that its drift-down performance following engine-failure (in the case of turbine-engined aircraft from a height not exceeding the maximum re-light altitude) will enable it to clear all obstacles on its route by the required margin regardless of the point at which the failure occurs. In other cases it may be necessary to calculate a critical point, or a number of critical points, which would determine the action to be taken in the event of engine failure at any given position, i.e. turn back, continue along the planned route or divert along an alternative route.

3 Instructions should take into account the accuracy of navigation which may be expected of the flight crew in view of the crew complement and the aids available. Account should also be taken of the effect of varying meteorological conditions. Assumed winds and temperatures used in the calculation of the critical point(s) must be indicated because, if forecast or actual conditions differ from these used at the planning stage, the pilot-in-command may require to amend the drift-down procedure.

APPENDIX F

NOISE ABATEMENT PROCEDURES

EFFECTIVE DATE : 15 JULY 2000
REVISION NO : 0 (ISSUE 3)

NOISE ABATEMENT PROCEDURES

1 Noise abatement regulations frequently require special handling techniques and routings after take-off. The flight manuals of the more recently certificated aeroplanes contain performance data related to noise abatement procedures. Details of the procedures for each airfield or runway used by the operator, for which noise abatement regulations exist, should be provided in the operations manual. Instructions to ignore noise abatement procedures in emergency situations should also be included.

2 Where, in exceptional circumstances, it may be appropriate in the course of noise abatement procedures to start a turn at less than 500 ft agl, pilots should be given suitable instructions about restricting the angle of bank. Pilots should also be instructed not to reduce thrust below 500 ft agl. Above 500 ft agl thrust should be reduced in accordance with the aircraft manufacturers instructions. In the absence of such guidance, thrust should not be reduced to an extent that would result in a gross gradient of climb of less than 4%.

APPENDIX G
MAINTENANCE AGREEMENT

EFFECTIVE DATE : 15 JULY 2000
REVISION NO : 0 (ISSUE 3)

1 Where an operator chooses to contract maintenance to another organisation, a written agreement must be drawn up indicating the divisions of responsibility between the two parties for the overall support of the aircraft and for compliance with statutory regulations and other relevant requirements.

2 The purpose of the agreement is to demonstrate a firm commitment by the two parties to the maintenance support of the aircraft in the operation for which application has been made for an Air Operator's Certificate.

3 It is strongly recommended that the portions of the agreement dealing with maintenance identify clearly those tasks which are to be accomplished by the contractor and those tasks which will remain the responsibility of the operator. This is particularly necessary where for example, the operator retains responsibility for line maintenance or spares provision.

4 The agreement should address the following matters:

(a) general arrangements for support of the operation by the maintenance organisation, and for technical liaison between operator and Maintenance Organisation;

(b) accomplishment of maintenance at the approved locations of the maintenance organisation;

(c) provision of appropriately approved/licensed maintenance personnel sufficient in numbers for the completion and certification of scheduled maintenance, the rectification of defects and the completion of duplicate inspections;

(d) training of maintenance personnel and, where necessary, the operator's flight crews;

(e) arrangements for line maintenance and ground handling at the operator's route stations, including major unscheduled arisings such as engine changes and defects requiring major dismantling or jacking;

(f) control and development of the Maintenance Schedule in response to service experience and manufacturers recommendations, the management and operation of reliability programmes, the preparation of documentation needed to implement the schedule and the arrangements for granting variations to the maintenance schedule requirements;

(g) airworthiness occurrence control and reporting to the manufacturer and the Authority including MOR, and the control of deferred and repetitive defects;

(h) maintaining logbooks, component service history, maintenance and other technical records and the transmission of Sector Record page information from the operator to the maintenance organisation;

(i) manufacturer's Service Bulletins/Information received, assessed and incorporated into modifications and manufacturer's technical programmes;

(j) compliance with mandatory requirements including mandatory modifications and inspections, and Airworthiness Directives, and for responding to other maintenance and airworthiness requirements published by the responsible Authorities;

(k) provision of spares, their storage and acceptance;

(l) ensuring the availability of the necessary tools and equipment to complete the scheduled maintenance and any other work arising under the terms of the agreement;

(m) provision of suitable maintenance accommodation at all locations where maintenance take place, appropriate to the task;

(n) quality auditing of the maintenance arrangements, including in particular the systems and procedures employed to achieve the control of airworthiness, at main base, line stations and en-route wherever support and ground handling takes place.

5 Details of the financial aspect of maintenance agreements may be omitted.

APPENDIX H

QUALITY ASSURANCE CHECKS

EFFECTIVE DATE : 15 JULY 2000
REVISION NO : 0 (ISSUE 3)

1 Engineering quality assurance procedures should ensure that sample checks identified in the paragraphs below are carried out.

Note: This summary of quality assurance checks is not exhaustive but is intended to provide an indication of the range of checks necessary. Additional or difference checks may be needed in respect of particular support arrangements.

1.1 **Checks on Aircraft whilst undergoing Scheduled Maintenance for:**

(a) compliance with maintenance schedule requirements and ensuring that only worksheets and cards reflecting the latest amendment standard are used;

(b) completion of worksheets, including the transfer of defects to additional worksheets; their control, and final assembly. Action taken in respect of items carried forward, not completed during the particular inspection or maintenance task;,

(c) compliance with manufacturer's and company standard specifications;

(d) standards of inspection and workmanship;

(e) conservation of aircraft corrosion prevention techniques and other protective processes;

(f) procedures adopted during shift-changeover to ensure continuity of inspection and responses;

(g) precautions taken to ensure that all aircraft are checked, on completion of any work or maintenance, for loose tools and miscellaneous small items such as split pins, wire, rivets, nuts, bolts and other debris, general cleanliness and housekeeping.

1.2 **Checks on Aircraft in Service for:**

(a) compliance with company approved practices for cargo restraint, load distribution and spreading such that the approved modifications for cargo configurations are observed.

(b) procedures to ensure that the APS weight data in use reflects the aircraft configuration and weight and balance schedule,

(c) satisfactory condition of cargo/baggage compartments and their linings, cargo handling and restraint equipment and special provisions for the carriage of livestock and attendants,

(d) continuing compliance with CAAS Airworthiness Notices in respect of cabin and other safety provisions.

1.3 **Checks on Technical Logs for:**

(a) correct completion of sector record pages and their transmission to technical records;

(b) satisfactory rectification of defects for their deferral in accordance with the MEL and company procedures. The recording of component details and stores control numbers, cross-referencing to deferred defect records and additional worksheets where appropriate and the inclusion of rectification details in the Sector Record Page;,

(c) compliance with required reporting procedures in the event of flights taking place after rectification of defects without issue of a Certificate of release to Service;

(d) certification of modifications including the installation of role equipment such as stretchers and conversion of the aircraft from passenger to cargo roles, and return to passenger;

(e) correct use of maintenance and inspection control systems included in the technical log for the completion of scheduled and pre-planned tasks between Scheduled Maintenance Inspections;

(f) operation of systems for recording external damage to the aircraft which has been inspected and is considered safe for further operation.

1.4 **Checks on Technical Service Information for:**

(a) adequacy of aircraft manuals and other technical information appropriate to each aircraft type, including engines, propellers and other equipment, and the continuing receipt of revisions and amendments;

(b) assessment of manufacturers service information, determining its application to the Operator's aircraft and the recording of compliance or embodiment in each aircraft;

(c) maintaining a register of manuals and technical literature held within the company, their locations and current amendment states,

(d) ensuring that all company manuals and documents, both technical and procedural, are kept up to date.

1.5 **Checks on the Operator's General Airworthiness Control Procedures for:**

(a) responding to the requirements of Airworthiness Directives, mandatory modifications and inspections, CAAS Airworthiness Notices and special fleet checks instituted in response to occurrences etc;

(b) monitoring company practices in respect of scheduling or pre-planning maintenance tasks to be carried out in the open, and adequacy of the facilities provided;

(c) effective completion of maintenance reviews at intervals required by the approved maintenance schedule and the availability of information to the certificate signatory;

(d) operation of the defects analysis system for the operator's airframes, engines and systems and its integration with the system for mandatory occurrence reporting; the highlighting of repetitive defects and the control of deferred defects;

(e) approval of personnel to perform inspections and maintenance tasks on the Operator's aircraft and for the issue of CMR and CRS; the effectiveness and adequacy of training and the recording of personnel experience, training and qualifications for grant of authorisation;

(f) the effectiveness of technical instructions issued to maintenance staff;

(g) the adequacy of staff in terms of qualifications, numbers and ability in all areas of support for the operator which affect airworthiness;

(h) the completeness of the quality audit programme;

(i) compliance with the requirements of the approved Maintenance Schedule, including maintenance/inspection periods, component overhaul/test/ calibration control, records of cycles/landings etc and for granting variations at the request of the operator;

(j) maintaining logbooks and other required records on behalf of the operator;

(k) ensuring that major and minor repairs are only carried out in accordance with approved repair schemes and practices.

1.6 **Checks on Stores and Storage Procedures for:**

(a) the adequacy of stores and storage conditions for rotable components, small parts, perishable items, flammable fluids, engines and bulky assemblies;

(b) the procedure for examining incoming components, materials and items for conformity with order, release documentation and approved source;

(c) the 'batching' of goods and identification of raw materials, the acceptance of part life items into stores, requisition procedures;

(d) labelling procedures, including the use of serviceable/unserviceable/repairable labels, and their certification and final disposal after installation. Also labelling procedures for components which are serviceable but 'part life' only;

(e) the internal release procedure to be used when components are to be forwarded to other locations within the organisation;

(f) the procedure to be adopted for the release of goods or overhauled items to other organisations. (This procedure should also cover items being sent away for rectification or calibration);

(g) the procedure for the requisitioning of tools together with the system for ensuring that the location of tools is known at all times;

(h) control of shelf life and storage conditions in the stores. Control of the free-issue dispensing of standard parts, identification and segregation.

1.7 **Checks on Maintenance Facilities for:**

(a) cleanliness, state of repair and correct functioning of hangars, hangar facilities and special equipment, and the maintenance of mobile equipment;

(b) adequacy and functioning of special services and techniques including welding, NDT, weighing, painting;

(c) viewer/printer equipment provided for use with micro-fiche, micro-film and compact disk ensuring regular maintenance takes place and an acceptable standard of screen reproduction and printed copy are achieved;

(d) the adequacy of special tools and equipment appropriate to each type of aircraft, including engines, propellers and other equipment.

1.8 **Checks on Line Stations, in addition to the foregoing as applicable, for:**

(a) the adequacy of facilities and staff;

(b) the provision of covered accommodation for aircraft when maintenance is undertaken which requires a controlled environment, and for the accomplishment of work in the open where this is unavailable;

(c) the cleanliness, state of repair, correct functioning and maintenance of ground support equipment including ground de-icing/anti-icing equipment;

(d) the effectiveness of any sub-contracted arrangements for ground handling, servicing and maintenance support and compliance with the operator's contracted arrangements;

(e) quality monitoring of fuel supplies including supplier checks and uplift contamination checks; the effectiveness and completion of fuel tank water drain checks;

(f) the care and maintenance of cargo containers, freight nets, pallets and other cargo equipment;

(g) the currency, scope and effectiveness of locally raised technical instructions and the procedure for bringing them to the notice of maintenance personnel;

(h) adequacy of the technical publications held at the station for the operator's aircraft, their currency and procedures for amendment;

(i) the accuracy and control of worksheets or cards, to ensure that only up-to-date issues are used.

APPENDIX I

AVIATION SECURITY TRAINING SYLLABUS-ALL CREW

EFFECTIVE DATE : 23 JULY 2010
REVISION NO : 18 (ISSUE 3)

RECOMMENDED AVIATION SECURITY TRAINING SYLLABUS - ALL CREW

The security training programme established by the operator shall include at least the following elements:

(a) Determination of the seriousness of any occurrence.

(b) Crew communication and coordination.

(c) Appropriate self-defence responses.

(d) Use of non-lethal protective devices assigned to crew members whose use is authorised by the Authority.

(e) Potentially disruptive passengers.

(f) Understanding of behaviour of terrorists so as to facilitate the ability of crew members to cope with hijacker behaviour and passenger responses.

(g) Live situational training exercises regarding various threat conditions.

(h) Flight deck procedures to protect the aeroplane.

(i) Aeroplane search procedures and guidance on least-risk bomb locations where practicable.

(j) Recognition of firearms, explosives and incendiary devices and their components.

(k) Instructions and guidance for searching a bomb and/or inspecting an aircraft for concealed weapons, explosives and other dangerous devices.

(l) Policy and procedures in relation to a bomb threat or warning, when the aircraft is on ground or in flight.

(m) Instructions and guidance on appropriate course of action to be taken should a bomb or suspicious object be found.

(n) Information on the least risk bomb location specific to the aeroplane.

(o) Discreet communication to flight crew by cabin crew in the event of suspicious activity or security breaches in the passenger cabin.

REFRESHER TRAINING

(a) Current threat assessment.

(b) Review of recent incidents: lessons to be learned.

(c) Government advice.

(d) Reminders of company emergency procedures, manual amendments, etc.

(e) Update of initial training course as appropriate.

APPENDIX J
DANGEROUS GOODS TRAINING

EFFECTIVE DATE : 9 FEBRUARY 2015
REVISION NO : 27 (ISSUE 3)

1 DANGEROUS GOODS TRAINING FOR OPERATORS

1.1 An operator, regardless of it holding an approval to carry dangerous goods, shall establish and maintain staff training programmes, as required by the ICAO Technical Instructions. These training programmes shall be approved by the Authority.

1.2 An operator shall ensure that all staff who receive training undertake a test to verify understanding of their responsibilities.

1.3 Training must be provided or verified upon the employment of personnel identified in accordance with the applicable column of Table 1 or Table 2 below.

1.4 An operator shall ensure that all staff who require dangerous goods training receive recurrent training at intervals of not longer than two years.

1.5 An operator shall ensure that records of dangerous goods training are maintained for all staff trained as required by the ICAO Technical Instructions and shall include the following:

(a) the individual's name;
(b) the most recent training completion date;
(c) a description, copy or reference to training materials used to meet the training requirements;
(d) the name and address of the organisation providing the training; and
(e) evidence which shows that a test has been completed satisfactorily.

1.6 The records of training must be made available upon request by the Authority.

1.7 An operator shall ensure that his handling agent's staff is trained in accordance with the applicable column of Table 1 or Table 2 below.

2 INSTRUCTOR QUALIFICATIONS

2.1 Instructors of initial and recurrent dangerous goods training programmes must have adequate instructional skills and have successfully completed a dangerous goods training programme.

2.2 Instructors delivering initial and recurrent dangerous goods training programmes must at least every 24 months deliver such courses, or in the absence of this, attend recurrent training.

3 OPERATORS NOT HOLDING A PERMANENT APPROVAL TO CARRY DANGEROUS GOODS

3.1 Operators not holding a permanent approval to carry dangerous goods shall ensure that:

3.1.1 staff who are engaged in general cargo and baggage handling have received training to carry out their duties in respect of dangerous goods. As a minimum, this training must cover the areas identified in Column 1 of Table 1 and the depth of training must be sufficient to ensure awareness and knowledge of the hazards associated with dangerous goods, identification of dangerous goods and requirements for the carriage of dangerous goods by passengers.

3.1.2 the following personnel:

(a) crew members;
(b) passenger handling staff; and
(c) security staff employed by the operator who deal with the screening of passengers and their baggage;

have received training which, as a minimum, must cover the areas identified in Column 2 of Table 1 and the depth of training must be sufficient to ensure awareness and knowledge of the hazards associated with dangerous goods, identification of dangerous goods and requirements for the carriage of dangerous goods by passengers.

Table 1

Areas of Training	1	2
General Philosophy	X	X
Limitations on Dangerous Goods in Air Transport		X
Package Marking and Labelling	X	X
Dangerous Goods in Passengers' Baggage	X	X
Emergency Procedures	X	X
Note: "X" indicates an area to be covered		

4 OPERATORS HOLDING A PERMANENT APPROVAL TO CARRY DANGEROUS GOODS

4.1 Operators holding a permanent approval to carry dangerous goods shall ensure that:

4.1.1 staff who are engaged in the acceptance of dangerous goods have received training and are qualified to carry out their duties. As a minimum this training must cover the areas identified in Column 1 of Table 2 and the depth of training must be sufficient to ensure staff is able to make decisions regarding the acceptance or refusal of the carriage of dangerous goods;

4.1.2 staff who are engaged in ground handling, storage and loading of dangerous goods have received training to enable them to carry out their duties in respect of dangerous goods. As a minimum this training must cover the areas identified in Column 2 of Table 2 and the depth of training must be sufficient to ensure awareness and knowledge of the hazards associated with dangerous goods, identification of dangerous goods and handling and loading of dangerous goods;

4.1.3 staff who are engaged in general cargo and baggage handling have received training to enable them to carry out their duties in respect of dangerous goods. As a minimum this training must cover the areas identified in Column 3 of Table 2 and the depth of training must be sufficient to ensure awareness and knowledge of the hazards associated with dangerous goods, identification of dangerous goods, handling and loading of dangerous goods and requirements for the carriage of dangerous goods by passengers;

4.1.4 flight crew members have received training which, as a minimum, must cover the areas identified in Column 4 of Table 2. The depth of training must be sufficient to ensure awareness and knowledge of the hazards associated with dangerous goods and how they should be carried on an aircraft; and

4.1.5 the following personnel:

(a) passenger handling staff;
(b) security staff employed by the operator who deal with the screening of passengers and their baggage; and
(c) crew members other than flight crew members;

have received training which, as a minimum, must cover the areas identified in Column 5 of Table 2. The depth of training must be sufficient to ensure awareness and knowledge of the hazards associated with dangerous goods, requirements for carriage of dangerous goods by passengers or, more generally, their carriage on an aircraft.

Table 2

Areas of Training	1	2	3	4	5
General Philosophy	X	X	X	X	X
Limitations on Dangerous Goods in Air Transport	X	X		X	X
Classification of Dangerous Goods	X				
List of Dangerous Goods	X	X		X	
General Packing Requirements and Packing Instruction	X				
Packaging Specifications and Markings	X				
Package Marking and Labelling	X	X	X	X	X
Documentation from the Shipper	X				
Acceptance of Dangerous Goods, including the Use of Checklist	X				
Storage and Loading Procedures	X	X	X	X	
Inspections for Damage or Leakage and Decontamination Procedures	X	X			
Provision of Information to Pilot-in-command	X	X		X	
Dangerous Goods in Passengers' Baggage	X	X	X	X	X
Emergency Procedures	X	X	X	X	X
Note: "X" indicates an area to be covered					

APPENDIX K1
FLIGHT SAFETY DOCUMENTS SYSTEM

EFFECTIVE DATE : 17 JULY 2008
REVISION NO : 11 (ISSUE 3)

1 ORGANISATION

1.1 A flight safety documents system should be organised according to criteria which are essential to provide easy access to information required for flight and ground operations contained in the various operational documents comprising the system, as well as to manage the distribution and revision of operational documents.

1.2 Information contained in a flight safety documents system should be grouped according to the importance and use of the information, as follows:

(a) time critical information e.g. information that can jeopardise the safety of the operation if not immediately available e.g. Flight Staff Instructions, Internal Notice To AirMan (INTAM).

(b) time sensitive information e.g. information that can affect the level of safety or delay the operation if not available in a short time period.

(c) frequently used information e.g. Operations Manual, Operator's Policies, QRH etc.

(d) reference information, e.g. information that is required for the operation but does not fall under (b) or (c) above; and

(e) information that can be grouped based on the phase of operation in which it is used.

1.3 Time critical information should be placed early and prominently in the flight safety documents system.

1.4 Time critical information, time sensitive information, and frequently used information should be placed in cards and quick-reference guides.

2 VALIDATION

2.1 The flight safety documents system should be validated before deployment, under realistic conditions. Validation should involve the critical aspects of the information use, in order to verify its effectiveness. Interaction among all groups that can occur during operations should be also be included in the validation process.

3 DESIGN

3.1 A flight safety documents system should maintain consistency in terminology, and in the use of standard terms for common items and actions.

3.2 Operational documents should include a glossary of terms, acronyms and their standard definition updated on a regular basis to ensure access to the most recent terminology. All significant terms, acronyms and abbreviation included in the flight documents system should be defined.

3.3 A flight safety documents system should ensure standarisation across documents types, including writing style, terminology use of graphics and symbols, and formatting across documents. This includes a consistent location specific types of information, consistent use of units of measurement and consistent use of codes.

3.4 A flight safety documents system should include a master index to locate, in a timely manner, information included in more than one operational document.

***Note** : The master index must be placed in the front of each document and consist of no more than three levels of indexing. Pages containing abnormal and emergency information must be tabbed for direct access.*

3.5 A flight safety documents system could comply with the requirements of the operator's quality system, where applicable.

4 DEPLOYMENT

4.1 Operators shall monitor deployment of the flight safety documents system, to ensure appropriate and realistic use of the documents, based on the characteristics of the operational environment and in a way which is both operationally relevant and beneficial to operational personnel. This monitoring shall include a formal feedback system for obtaining input from operational personnel.

5 AMENDMENT

5.1 Operators shall develop an information gathering, review, distribution and revision control system to process information and data obtained from all sources relevant to the type of operation conducted.

Note: Aircraft manufacturers provide information for the operation of specific aircraft that emphasises the aircraft systems and procedures under conditions that may not fully match the requirements of operators. Operators shall ensure that such information meets their specific needs.

5.2 Operators shall develop an information gathering, review and distribution system to process information resulting from changes that originates within the operator, including:

(a) changes resulting from the installation of new equipment;
(b) changes in response to operating experience;
(c) changes in an operator's policies and procedures;
(d) changes in an operator certificate; and
(e) changes for purposes of maintaining cross fleet standardisation.

Note: Operators shall ensure that crew coordination philosophy, policies and procedures are specific to their operation.

5.3 A flight safety documents system shall be reviewed:

(a) at least once a year;
(b) after major events (mergers, acquisitions, rapid growth, downsizing, etc.);
(c) after technology changes (introduction of new equipment); and
(d) after changes in safety regulations.

5.4 Operators shall develop methods of communicating new information. The specific methods should be responsive to the degree of communication urgency.

Note: As frequent changes diminish the importance of new or modified procedures, it is desirable to minimise changes to the flight safety documents system.

5.5 New information shall be reviewed and validated considering its effects on the entire flight safety documents system.

5.6 The method of communicating new information shall be complemented by a tracking system to ensure currency by operational personnel. The tracking system should include a procedure to verify that operational personnel have the most recent updates.

APPENDIX K2
ORGANISATION AND CONTENTS OF AN OPERATIONS MANUAL

EFFECTIVE DATE : 30 NOVEMBER 2015
REVISION NO : 29 (ISSUE 3)

1 ORGANISATION

An operations manual shall be organised with the following structure:

(a) General;
b) Aircraft operating information;
c) Routes and aerodromes; and
d) Training.

2 CONTENTS

The operations manual shall contain at the least the following:

2.1 General

2.1.1 Instructions outlining the responsibilities of each member of the crew and the other members of the operating staff pertaining to the conduct of flight operations.

2.1.2 Flight and duty time limitations and rest schemes for flight and cabin crew members.

2.1.3 A list of the navigational equipment to be carried including any requirements relating to operations where performance-based navigation is prescribed.

2.1.4 Where relevant to the operations, the long-range navigation procedures, engine failure procedure for EDTO and the nomination and utilisation of diversion aerodromes.

2.1.5 The circumstances in which a radio listening watch is to be maintained.

2.1.6 The method for determining minimum flight altitudes.

2.1.7 The methods for determining aerodrome operating minima.

2.1.8 Safety precautions during refuelling with passengers on board.

2.1.9 Ground handling arrangements and procedures.

2.1.10 Procedures for pilots-in-command when an accident is observed.

2.1.11 The flight crew for each type of operation including the designation of the succession of command.

2.1.12 Specific instructions for the computation of the quantities of fuel and oil to be carried, taking into account all circumstances of the operation including the possibility of loss of pressurisation and the failure of one or more engines while en route.

2.1.13 The conditions under which oxygen shall be used and the amount of oxygen determined in accordance with the Fifth Schedule of the ANO.

2.1.14 Instructions for mass and balance control.

2.1.15 Instructions for the conduct and control of ground de-icing/anti-icing operations.

2.1.16 The specifications for the operational flight plan.

2.1.17 Standard operating procedures (SOP) for each phase of flight.

2.1.18 Instructions on the use of normal checklists and the timing of their use.

2.1.19 Departure contingency procedures.

2.1.20 Instructions on the maintenance of altitude awareness and the use of automated or flight crew altitude call-out.

2.1.21 Instructions on the use of autopilots and auto throttles in IMC.

Note. Instructions on the use of autopilots and auto-throttles, together with 2.1.26 and 2.1.30, are essential for avoidance of approach and landing accidents and controlled flight into terrain accidents.

2.1.22 Instructions on the clarification and acceptance of ATC clearances, particularly where terrain clearance is involved.

2.1.23 Departure and approach briefings.

2.1.24 Procedures for familiarisation with areas, route and aerodromes.

2.1.25 Stabilised approach procedure.

2.1.26 Limitation on high rates of descent near the surface.

2.1.27 Conditions required to commence or to continue an instrument approach.

2.1.28 Instructions for the conduct of precision and non-precision instrument approach procedures.

2.1.29 Allocation of flight crew duties and procedures for the management of crew workload during night and IMC instrument approach and landing operations.

2.1.30 Instructions, training or awareness programmes, as appropriate for -

(a) the avoidance of controlled flight into terrain and policy for the use of the ground promixty warning systems (GPWS); and

(b) upset prevention of and recovery.

2.1.31 Policy, instructions, procedures and training requirements for the avoidance of collisions and the use of the airborne collision avoidance system (ACAS).

Note: Procedures for the operation of ACAS are contained in PANS-OPS (ICAO Doc 8168),Volume 1, Part VIII, Chapter 3, and in PANS-ATM (ICAO Doc 4444), Chapters 12 and 15.

2.1.32 Information and instructions relating to the interception of civil aircraft including:

(a) procedures, for pilots-in-command of intercepted aircraft; and

(b) visual signals for use by intercepting and intercepted aircraft.

2.1.33 For aeroplanes intended to be operated above 49 000 ft (15 000 m):

(a) information which will enable the pilot to determine the best course of action to take in the event of exposure to solar cosmic radiation; and

(b) procedures in the event that a decision to descend is taken, covering:

(1) the necessity of giving the appropriate ATS unit prior warning of the situation and of obtaining a provisional descent clearance;

(2) the action to be taken in the event that communication with the ATS unit cannot be established or is interrupted; and

(c) procedures to maintain records such that the total cosmic radiation dose received by each crew member over a period of 12 consecutive months can be determined.

2.1.34 Information on the safety management system and related flight safety programs as are relevant to flight operations

2.1.35 Information and instructions on the carriage of dangerous goods, including action to be taken in the event of an emergency. These shall include the labelling and marking of dangerous goods, the manner in which they must be loaded on or suspended beneath an aircraft, the responsibilities of members of the crew in respect of the carriage of dangerous goods and the action to be taken in the event of emergencies arising involving dangerous goods.

Note: Guidance material on the development of policies and procedures for dealing with dangerous goods incidents on board aircraft is contained in Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods (ICAO Doc 9481)

2.1.36 Security instructions and guidance.

2.1.37 A checklist of the procedures to be followed in searching for a bomb in case of suspected sabotage and for inspecting aeroplanes for concealed weapons, explosives or other dangerous devices when a well-founded suspicion exists that the aeroplane may be the object of an act of unlawful interference, supported by guidance on the course of action to be taken should a bomb or suspicious object be found and information on the least-risk bomb location specific to the aircraft.

2.1.38 Instructions and training requirements for the use of head-up displays (HUD) and enhanced vision systems (EVS) equipment as applicable.

2.1.39 Instructions and training requirements for the use of the EFB, as applicable.

2.2 **Aircraft operating information**

2.2.1 Certification limitations and operating limitations.

2.2.2 The normal, abnormal and emergency procedures and checklists to be used by the flight crew

2.2.3 Operating instructions and information on climb performance with all engines operating

2.2.4 Flight planning data for pre-flight and in-flight planning with different thrust/power and speed settings.

2.2.5 The maximum crosswind and tailwind components for each aeroplane type operated and the reductions to be applied to these values having regard to gusts, low visibility, runway surface conditions, crew experience, use of autopilot, abnormal or emergency circumstances, or any other relevant operational factors.

2.2.6 Instructions for aircraft loading and securing of load.

2.2.7 Aircraft systems, associated controls and instructions for their use

2.2.8 The minimum equipment list and configuration deviation list for the aeroplane types operated and specific operations authorised, including any requirements relating to operations in where performance-based navigation is prescribed.

2.2.9 Checklist of emergency and safety equipment and instructions for their use.

2.2.10 Emergency evacuation procedures, including type specific procedures, crew coordination, assignment of crew's emergency positions and the emergency duties assigned to each crew member.

2.2.11 The normal, abnormal and emergency procedures to be used by the cabin crew, the checklists relating thereto and aircraft systems information as required, including a statement related to the necessary procedures for the coordination between flight and cabin crew.

2.2.12 Survival and emergency equipment for different routes and the necessary procedures to verify its normal functioning before take-off, including procedures to determine the required amount of oxygen and the quantity available.

2.2.13 The ground-air visual signal code for use by survivors,

2.3 **Routes, aerodromes and heliports**

2.3.1 A route guide to ensure that the flight crew will have, for each flight, information relating to communication facilities, navigation aids, aerodromes, instrument approaches, instrument arrivals and instrument departures as applicable for the operation, and such other information as the operator may deem necessary for the proper conduct of flight operations.

2.3.2 The minimum flight altitudes for each route to be flown.

2.3.3 Aerodrome operating minima for each of the aerodromes that are likely to be used as aerodromes of intended landing or as alternate aerodromes.

2.3.4 The increase of aerodrome operating minima in case of degradation of approach or aerodrome facilities.

2.3.5 Instructions for determining aerodrome operating minima for instrument approaches using HUD and EVS.

2.3.6 The necessary information for compliance with all flight profiles required by regulations, including but not limited to, the determination of:

(a) take-off runway length requirements for dry, wet and contaminated conditions, including those dictated by system failures which affect the take-off distance;

(b) take-off climb limitations;

(c) en-route climb limitations;

(d) approach climb limitations and landing climb limitations;

(e) landing runway length requirements for dry, wet and contaminated conditions, including systems failures which affect the landing distance; and

(f) supplementary information, such as tire speed limitations.

2.4 **Training**

2.4.1 Details of the flight crew training programme.

2.4.2 Details of the cabin crew duties training programme.

2.4.3 Details of the flight operations officer/flight dispatcher training programme when employed in conjunction with the operator's method of flight supervision.

APPENDIX L
FLIGHT DISPATCHERS

EFFECTIVE DATE : 9 FEBRUARY 2015
REVISION NO : 27 (ISSUE 3)

1 INTRODUCTION

1.1 Operators are required to demonstrate an adequate organisation method of control and supervision of flight operation. A flight operations officer/flight dispatcher is normally employed to provide supervision of flight and to act as a close link between aircraft in flight and the ground services, and also between the aircrew and the operators' ground staff.

1.2 Singapore does not issue flight operations officer/flight dispatcher licences. Flight operations officers/Flight dispatcher applicants must meet the criteria established in this Appendix.

2 BASIC REQUIREMENTS

2.1 Age

2.1.1 The applicant shall not be less than 21 years of age.

2.2 Knowledge

2.2.1 The applicant shall be able to demonstrate an appropriate level of knowledge in at least the subjects specified in paragraph 6. Such demonstration of knowledge shall be by means of an examination equivalent to that required to be undertaken by an applicant who has completed a course of training in accordance with paragraph 2.3.1 (c).

2.3 Experience

2.3.1 An applicant to be a flight operations officer/flight dispatcher shall have gained at least the following experience:

(a) a total of 2 years of service in any one or in any combination of the capacities specified below, provided that in any combination of experience the period serviced in any capacity shall be at least one year:

(1) a flight crew member in air transportation; or
(2) a meteorologist in an organisation dispatching aircraft in air transportation; or

(3) an air traffic controller; or a technical supervisor of flight operations officers or air transportation flight operations systems; or

(b) at least one year' as an assistant in the dispatching of air transport aircraft; or

(c) have satisfactorily completed a course of approved training.

2.3.2 The applicant shall have served under the supervision of a flight dispatcher for at least 90 working days within the six months immediately preceding the application.

2.4 **Skill**

2.4.1 The applicant shall have demonstrated the ability to:

(a) make an accurate and operationally acceptable weather analysis from a series of daily weather maps and weather reports; provide an operationally valid briefing on weather conditions prevailing in the general neighbourhood of a specific air route; forecast weather trends pertinent to air transportation with particular reference to destination and alternates;

(b) determine the optimum flight plan for a given segment, and create accurate manual and/or computer generated flight plans; and

(c) provide operating supervision and all other assistance to a flight in actual or simulated adverse weather conditions, as appropriate to the duties of a flight operations officer/flight dispatcher.

3 ADDITIONAL OPERATOR-SPECIFIC REQUIREMENTS

3.1 In addition to the basic requirements given in paragraph 2 above, the operator shall not assign a flight operations officer/flight dispatcher to duty unless that person has:

(a) satisfactorily completed a training course specific to the operator that addresses all the components of the operator's approved method of control and supervision of flight operations;

(b) made, within the preceding 12 months, at least one qualification flight in the flight crew compartment of an aircraft over any area for which that individual is authorised to exercise flight supervision.

Note: *For the purpose of the qualification flight, the flight operations officer/flight dispatcher must be able to monitor the flight crew intercommunication system and radio communications, and be able to observe the actions of the flight crew from the crew reporting time until the completion of the crew's post-flight duties.*

(c) demonstrated to the operator a knowledge of:

(1) the contents of the operations manual;

(2) the radio equipment in the aircraft used; and

(3) the navigation equipment in the aircraft used;

(d) demonstrated to the operator a knowledge of the following details concerning operations for which the officer is responsible and areas in which that individual is authorised to exercise flight supervision:

(1) the seasonal meteorological conditions and the sources of meteorological information;

(2) the effects of meteorological conditions on radio reception in the aircraft used;

(3) the peculiarities and limitations of each navigation system which is used by the operation; and

(4) the aircraft loading instructions;

(e) demonstrated to the operator knowledge and skills related to human performance relevant to dispatch duties; and

(f) demonstrated to the operator the ability to perform the duties specified in Chapter 2 of the AOCR.

4 AUTHORISATION BY THE OPERATOR

4.1 The operator shall establish a system to ensure that each flight operations officer/flight dispatcher assigned to duty continues to meet all the requirements in this Appendix.

4.2 The operator shall ensure that appropriate action is taken to suspend, vary or revoke the authorisation of a flight operations officer/flight dispatcher in the event that he or she fails to continue to meet the requirements of this Appendix**.**

5 MAINTAINING CURRENCY

5.1 To maintain currency, a flight operations officer/flight dispatcher must dispatch at least one flight every 90 consecutive days. A flight operations officer/flight dispatcher who fails to do so shall be required dispatch at least one flight under the supervision of another flight operations officer/flight dispatcher prior to resuming duties.

5.2 A flight operations officer/flight dispatcher who has not dispatched at least one flight in the preceding 12 months shall be required to attend refresher training, pass a written assessment paper and dispatch at least one flight under the supervision of another flight operations officer/flight dispatcher prior to resuming duties.

5.3 Every flight operations officer/flight dispatcher shall undergo a recurrent training programme approved by the Authority and pass a proficiency test conducted by the operator once every 24 months.

6 TRAINING SYLLABUS

6.1 An operator intending to develop a course of training to qualify flight operations officers/flight dispatchers in accordance with paragraph 2.3.1(c) shall submit the basic training syllabi for initial qualification training to the Authority for approval. The syllabi shall be part of AOC holders' operation manual and training manual. The training shall cover the contents specified below and include an examination at the end of the course.

FLIGHT OPERATION OFFICER/FLIGHT DISPATCHER

6.2 PHASE ONE – BASIC KNOWLEDGE

6.2.1 **Civil Air Law and Regulations**

Certification of operators.
The Convention on International Civil Aviation
(The Chicago Convention).
International air transport issues addressed by the Chicago Convention.
The International Civil Aviation Organisation (ICAO).
Responsibility for aircraft airworthiness.
Regulatory provisions of the flight manual.
The aircraft minimum equipment list (MEL).
The Operations Manual and its use
Rules of the Air

6.2.2 **Aviation Indoctrination**

Regulatory.
Aviation terminology and terms of reference.
Theory of flight and flight operations.
Aircraft propulsion systems.
Aircraft systems.

6.2.3 **Aircraft mass (weight) and performance**

Basic principles for flight safety.
Basic mass (weight) and speed limitations.
Take-off runway requirements.
Climb performance requirements.
Landing runway requirements.
Buffet boundary speed limitations.

6.2.4 **Navigation**

Position and distance; time.
True, magnetic and compass direction; gyro heading reference and grid direction.
Introduction to chart projection:
(a) the Mercator projection;
(b) great circles on Mercator charts;
(c) other cylindrical projections;
(d) Lambert conformal conic projections;

(e) the polar stereographic projection.
ICAO chart requirements.
Charts used by a typical operator.
Measurement of airspeed; track and ground speed.
Use of slide-rules, computers and scientific calculators.
Measurement of aircraft altitude.
Point of no return; critical point; general determination of aircraft position.
Introduction to radio navigation; ground-based radar and direction-finding stations; relative bearings; VOR/DME-type radio navigation; instrument landing systems.
Navigation procedures.
ICAO CNS/ATM systems (an overview)

6.2.5 **Air traffic management**

Introduction to air traffic management.
Controlled airspace.
Flight rules.
ATC clearance; ATC requirements for flight plans; aircraft reports.
Flight information service (FIS).
Alerting service and search and rescue.
Communications services (mobile, fixed).
Aeronautical information service (AIS).
Aerodrome and airport services.

6.2.6 **Meteorology**

Atmosphere; atmospheric temperature and humidity.
Atmospheric pressure; pressure-wind relationships.
Winds near the Earth's surface; wind in the free atmosphere; turbulence.
Vertical motion in the atmosphere; formation of clouds and precipitation.
Thunderstorms; aircraft icing.
Visibility and RVR; volcanic ash.
Surface observations; upper-air observations; station model.
Air masses and fronts; frontal depressions.
Weather at fronts and other parts of the frontal depression; other types of pressure systems.
General climatology; weather in the tropics.
Aeronautical meteorological reports; analysis of surface and upper-air charts.
Prognostic charts; aeronautical forecasts.
Meteorological service for international air navigation.
Field trip to local meteorological office.

6.2.7 **Mass (weight) and balance control**

Introduction to mass and balance.
Load planning.
Calculation of payload and load sheet preparation.
Aircraft balance and longitudinal stability.
Moments and balance.
The structural aspects of aircraft loading.
Dangerous goods and other special cargo.
Issuing loading instructions.

6.2.8 **Transport of dangerous goods by air**

Introduction.
Dangerous goods, emergency and abnormal situations.
Source documents.
Responsibilities.
Emergency procedures.

6.2.9 **Flight planning**

Introduction to flight planning.
Turbo-jet aircraft cruise control methods.
Flight planning charts and tables for turbine-engined aircraft.
Calculation of flight time and minimum fuel for turbine-engined aircraft.
Route selection.
Flight planning situations.
Reclearance.
The flight phases.
Documents to be carried on flights.
Flight planning exercises.
Threats and hijacking.
EDTO.

6.2.10 **Flight monitoring**

Position of aircraft.
Effects of ATC reroutes.
Flight equipment failures.
En-route weather changes.
Emergency situations.
Flight monitoring resources.
Position reports.
Ground resource availability.

6.2.11 **Communications – Radio**

International aeronautical telecommunications service.
Elementary radio theory.
Aeronautical fixed service.
Aeronautical mobile service.
Radio navigation service.
Automated aeronautical service.

6.2.12 **Human Factors**

The meaning of Human Factors.
Dispatch resource management (DRM).
Awareness.
Practice and feedback.
Reinforcement.

6.2.13 **Security (emergencies and abnormal situations)**

Familiarity.
Security measures taken by airlines.
Procedures for handling threats, bomb scares, etc.
Emergency due to dangerous goods.
Hijacking.
Emergency procedures.
Personal security for the FOO/FD.

6.2.14 **Crisis Management**
Emergency Response Plan

6.3 PHASE TWO – APPLIED PRACTICAL TRAINING

6.3.1 **Applied practical training**

Applied practical flight operations.
Simulator LOFT observation and synthetic flight training.
Flight dispatch practices (on-the-job training)
Route familiarisation.

APPENDIX M
ADDITIONAL REQUIREMENTS FOR APPROVED OPERATIONS BY SINGLE-ENGINE TURBINE-POWERED AEROPLANES AT NIGHT AND/OR IN INSTRUMENT METEOROLOGICAL CONDITIONS (IMC)

EFFECTIVE DATE : 15 JANUARY 2006
REVISION NO : 7 (ISSUE 3)

1 TURBINE ENGINE RELIABILITY

1.1 Turbine engine reliability shall be shown to have a world fleet power loss rate of less than 1 per 100,000 engine hours.

1.1.1 Power loss rate should be determined as a moving average over a specified period (e.g. a 12-month moving average if the sample is large). ***Power loss rate, rather than in-flight shut-down rate, is used as it is considered to be more appropriate for single-engine aeroplane***.

1.1.2 In determining power loss rate the actual period selected should reflect the global utilisation and the relevance of the experience included (e.g. early data may not be relevant due to subsequent mandatory modifications which affected the power loss rate). After the introduction of a new engine variant and whilst global utilisation is relatively low, the total available experience may have to be used to try to achieve a statistically meaningful average.

Note: Power loss in this context is defined as any loss of power, the cause of which may be traced to faulty engine or engine component design or installation, including design or installation of the fuel ancillary or engine control systems.

1.1.3 A reliability programme should be established covering the engine and associated systems. The engine programme should include engine hours flown in the period and in-flight shutdown rate for all causes and the unscheduled engine removal rate, both on a 12-month moving average basis. The event reporting process should cover all items relevant to the ability to operate safely at night and/or IMC. Any sustained adverse trend should result in an immediate evaluation by the operator in consultation with the Authority and the manufacturer with a view to determining actions to restore the intended safety level. The operator should develop a parts control programme with support from the manufacturer that ensures that the proper parts and configuration are maintained for single engine turbine-powered aeroplanes approved to conduct these operations. The programme includes verification that parts placed on an approved single engine turbine-powered aeroplane during parts borrowing or pooling arrangements, as well as those parts used after repair or overhaul, maintain the necessary configuration of that aeroplane approved for single engine operations.

1.1.4 In assessing turbine engine reliability, evidence should be derived from world fleet database covering as large a sample as possible of operations considered to be representative. Data from engine trend monitoring and event reports should also be monitored to ensure that there is no indication that the operator's experience is unsatisfactory.

1.2 The operator shall be responsible for engine trend monitoring which should include the following:

(a) an oil consumption monitoring programme based on manufacturers' recommendations; and

(b) an engine condition monitoring programme describing the parameters to be monitored, the method of the data collection and corrective action process, based on the manufacturer's recommendations. The monitoring is intended to detect turbine engine deterioration at an early stage before safe operation is affected.

1.3 To minimise the probability of in-flight engine failure, the engine shall be equipped with:

(a) an ignition system that activates automatically, or is capable of being operated manually, for take-off and landing, and during flight in visible moisture;

(b) a magnetic particle detection or equivalent system that monitors the engine, accessories gearbox and reduction gearbox, and which includes a flight deck caution indication; and

(c) an emergency engine power control device that permits continuing operation of the engine through a sufficient power range to safely complete the flight in the event of any reasonably probable failure of the fuel control unit.

2 SYSTEMS AND EQUIPMENT

2.1 Single-engine turbine-powered aeroplanes approved to operate at night and/or in IMC shall be equipped with the following systems and equipment intended to ensure continued safe flight and to assist in achieving a safe forced landing after an engine failure, under all allowable operating conditions:

(a) two separate electrical generating systems, each one capable of supplying all probable combinations of continuous in-flight electrical loads for instruments, equipment and systems required at night and/or in IMC;

(b) a radio altimeter;

(c) an emergency electrical supply system of sufficient capacity and endurance following loss of all generated power to, as a minimum:

(i) maintain the operation of all essential flight instruments, communication and navigation systems during a descent from the maximum certificated altitude in a glide configuration to the completion of a landing;

(ii) lower the flaps and landing gear, if applicable;

(iii) provide power to one pitot heater, which must serve an air speed indicator clearly visible to the pilot;

(iv) provide for operation of the landing light specified in sub-paragraph (j) below;

(v) provide engine restart, if applicable; and

(vi) provide for the operation of the radio altimeter;

(d) two attitude indicators, powered from independent sources;

(e) a means to provide for at least one attempt at engine re-start;

(f) airborne weather radar;

(g) a certified area navigation system capable of being programmed with the positions of aerodromes and safe forced landing areas, and providing instantly available track and distance information to those locations;

(h) for passenger operations, passenger seats and mounts which meet dynamically-tested performance standards and which are fitted with a shoulder harness or a safety belt with a diagonal shoulder strap for each passenger seat;

(i) in pressurised aeroplanes, sufficient supplemental oxygen for all occupants for descent following engine failure at the maximum glide performance from the maximum certificated altitude to an altitude at which supplemental oxygen is no longer required;

(j) a landing light that is independent of the landing gear and is capable of adequately illuminating the touchdown area in a night forced landing; and

(k) an engine fire warning system.

3 OPERATIOPNAL AND MAINTENANCE PROGRAMME REQUIREMENTS

3.1 The approval to undertake operations by single-engine turbine-powered aeroplanes at night and/or in IMC specified in the air operator certificate will include the particular airframe/engine combinations, including the current type design standard for such operations, the specific aeroplane approved, and the areas or routes of such operations.

3.2 The operator's maintenance control manual shall include a statement of certification of the additional equipment required, and of the maintenance and reliability programme for such equipment, including the engine.

4 OPERATIONS MANUAL AND ROUTE PLANNNING

4.1 The flight manual shall include limitations, procedures, approval status and other information relevant to operations by single-engined turbine-powered aeroplanes at night and/or in IMC.

4.2 The operations manual shall include all necessary information relevant to operations by single-engine turbine-powered aeroplanes at night and/or IMC. This shall include all of the additional equipment, procedures and training required for such operations, route and/or area of operation and aerodrome information (including planning and operating minima).

4.3 Route planning should take account of all relevant information in the assessment of intended routes or areas of operations, including the following:

(a) the nature of the terrain to be flown, including the potential for carrying out a safe forced landing in the event of an engine failure or major malfunction;

(b) weather information, including seasonal and other adverse meteorological influences that may affect the flight; and

(c) other criteria and limitations as specified by the Authority.

4.4 An operator should identify aerodromes or safe forced landing areas available for use in the event of engine failure, and the position of these shall be programmed into the area navigation system.

Note 1: A safe forced landing in this context means a landing in which it can reasonablybe expected that it will not lead to serious injury or loss of life, even though the aeroplane may incur extensive damage.

Note 2: Operation over routes and in weather conditions that permit a safe forced landing in the event of an engine failure, as specified in Chapter 2 paragraph 27.1, is not required by paragraphs 4 .3 and 4.4 above for aeroplanes approved in accordance with Chapter 2 paragraph 27.2. The availability of forced landing areas at all points along a route is not specified for these aeroplanes because of the very high engine reliability, additional systems and operational equipment, procedures and training requirements specified in this Appendix.

5 ROUTE LIMITATIONS OVER WATER

5.1 Operators of single-engine turbine-powered aeroplanes carrying out operations at night and/or in IMC should make an assessment of the route limitations over water. The distance from an area suitable for forced landing/ditching that the aeroplane may be operated should be determined, which equates to the glide distance from the cruise altitude to the forced landing area, following engine failure, assuming still air conditions. Additional distance may be included taking into account the likely prevailing conditions and the type of operation. This should include considerations for sea conditions, the survival equipment carried, the achieved engine reliability and the search rescue services available.

5.2 Any additional distance allowed beyond the glide distance should not exceed a distance equivalent to 15 minutes at the aeroplane's normal cruise speed.

6 MINIMUM EQUIPEMENT LIST

6.1 The minimum equipment list of an operator approved in accordance with AOCR Chapter 2 paragraph 27.2 shall specify the operating equipment required for night and/or IMC operations, and for day/VMC operations.

7 EVENT REPORTING

7.1 An operator approved for operations by single-engined turbine-powered aeroplanes at night and/or in IMC shall report all significant failures, malfunctions or defects to the Authority.

8 OPERATOR CERTIFICATION OR VALIDATION

8.1 The operator shall demonstrate the ability to conduct operations by single-engine turbine-powered aeroplanes at night and/or in IMC to the Authority.

8.2 The certification process should include the operator's ability to ensure adequacy of it's procedures for normal, abnormal and emergency operations, including actions following engine, systems or equipment failures. In addition to the normal requirements for operator certification or validation, the following items should be addressed in relation to operations by single-engine turbine-powered aeroplanes:

(a) proof of the achieved engine reliability of the aeroplane engine combination referred to in paragraph 1 above;

(b) specific and appropriate training and checking procedures including those to cover engine failure/malfunction on the ground, after take-off and en- route and descend to a forced landing from the normal cruising altitude;

(c) a maintenance programme which is extended to address the equipment and systems referred to in paragraph 2 above;

(d) an MEL modified to address the equipment and system necessary for operations at night and/or in IMC;

(e) planning and operating minima appropriate to the operations at night and/or in IMC;

(f) departure and arrival procedures and any route limitations;

(g) pilot qualifications and experience; and

(h) the operations manual, including limitations, emergency procedures, approved routes or areas of operation, the MEL and normal procedures related to the equipment referred to in Chapter 2 above.

APPENDIX O
OPERATIONAL CONTROL

EFFECTIVE DATE : 23 JULY 2010
REVISION NO : 18 (ISSUE 3)

1 OPERATIONAL CONTROL FUNCTIONS

1.1 AOC holders conduct operational control by making those decisions and performing those actions on a daily basis that are necessary to operate flights safely and in compliance with the regulations. Operational control functions include crew and aircraft scheduling, accepting charter flights from the public, reviewing weather and notices to airmen (NOTAM), and flight planning. Another aspect consists of developing and publishing flight control policies and procedures for flight crews and other operations personnel to follow in the performance of their duties.

1.2 AOC holders are responsible for collecting and disseminating information that is needed to plan and conduct flights safely, including information about enroute and terminal weather conditions, navigation, and aerodrome facilities.

2 OPERATIONAL CONTROL SYSTEMS

2.1 Operational control systems vary with the kind of operation the operator is authorised to conduct, the complexity of the operations, the means of communication, and with the persons who are involved in preparing for and conducting flights under the AOC holder's system.

3 OPERATOR OVERSIGHT RESPONSIBILITY

3.1 The AOC holder's safety and quality assurance responsibility includes ensuring that both its flight crew and operational control employees comply with published policies and procedures.

4 AOC HOLDER'S OPERATIONS MANUAL

4.1 AOC holders prepare and keep current a manual for the guidance of flight, ground and management personnel in the performance of their duties and responsibilities. AOC holder shall include in its Operations Manual the duties and responsibilities of those persons to whom authority to exercise operational control has been delegated, providing the name of each manager responsible for flight operations (operational control) including a description of their duties and functions.

4.2 The AOC holder's Operations Manual must contain guidance on the conditions that must be met before a flight may be initiated or continued, or under which a flight must be diverted or terminated.

5 SPECIFIC OPERATIONAL FUNCTIONS

5.1 Operational control includes, but is not limited to, the AOC holder's performance of the following functions:

(a) Ensuring that only those operations authorised by the AOC are conducted.

(b) Ensuring that only crewmembers trained and qualified in accordance with the applicable regulations are assigned to conduct a flight.

(c) Ensuring that crewmembers are in compliance with flight and duty time requirements when departing on a flight.

(d) Designating a PIC for each flight.

(e) Providing the PIC and other personnel who perform operational control functions with access to the necessary information for the safe conduct of the flight (such as weather, NOTAMs, and aerodrome analysis).

(f) Specifying the conditions under which a flight may be released (weather minima, flight planning, airworthiness of aircraft, aircraft loading, and fuel requirements).

(g) Ensuring that each flight has complied with the conditions specified for release before it is allowed to depart.

(h) Ensuring that when the conditions specified for a flight's release cannot be met, the flight is either cancelled delayed, re-routed, or diverted.

(i) Monitoring the progress of each flight and initiating timely actions when the flight cannot be completed as planned, including diverting or terminating a flight.

6 SPECIFIC OPERATIONAL CONTROL SYSTEMS

6.1 The operator must include, in the Operations Manual, policies and procedures appropriate to the flight release system used.

Note: The AOC holder's system for exercising operational control may be described in the AOC holder's SOPs.

7 OPERATIONAL STRUCTURE

7.1 An operational control function may be centralised in one individual or diversified throughout an AOC holder's organisation. In practice, it is not feasible for an individual to exercise operational control without assistance in any but the simplest of flight operations. Most AOC holders create specialised departments for crew scheduling, load control, and other functions. These functions may or may not be placed under the management and supervision of the "flight control" department. When these functions are delegated to specialised sections of the AOC holder's organisation, the operator is responsible for the following:

(a) Establishing a means to ensure that all functions have been accomplished before a flight can be authorised to depart

(b) Establish effective internal communications, operating procedures, and administrative controls to meet this obligation

(c) Ensuring that these procedures are published in the AOC holder's operations manual.

(d) Ensuring that all sub-contracted activities are carried out in adherence with its policies and procedures and that its sub-contractors provide timely notification to the operator of any irregularities that will affect the safety and operational status of an aircraft or a flight.

APPENDIX P

SAFETY MANAGEMENT SYSTEM FRAMEWORK ELEMENTS

EFFECTIVE DATE : 20 MAY 2011
REVISION NO : 21 (ISSUE 3)

The framework for the implementation and maintenance of a safety management system should include, as a minimum, the following 4 components and 12 elements:

Safety Policy and Objectives
- (a) Management commitment and responsibility
- (b) Safety accountabilities
- (c) Appointment of key safety personnel
- (d) Coordination of Emergency response planning
- (e) SMS Documentation

Safety Risk Management
- (f) Hazard identification
- (g) Safety Risk assessment and mitigation processes

Safety Assurance
- (h) Safety performance monitoring and measurement
- (i) Management of change
- (j) Continuous improvement of the SMS

Safety Promotion
- (k) Training and education
- (l) Safety Communication

Note: Refer to AC 1-3 for CAAS SMS guidance materials. Reference may also be made to ICAO SMM Document 9859 for any additional guidance where appropriate.

APPENDIX Q
REPORTABLE OCCURRENCES

EFFECTIVE DATE : 5 OCTOBER 2012
REVISION NO : 22 (ISSUE 3)

1 Objective

1.1 Pursuant to paragraph 88 of the ANO, the operator is required to report occurrences to the Chief Executive. The mandatory reporting system is an essential element of the Authority's overall safety oversight function. The objective of mandatory reporting is to gather information to analyse and monitor the health of the aviation safety system.

2 List of Reportable Occurrences

2.1 The operator shall report to the Authority:

(a) All accidents as defined by the Air Navigation (Investigation of Accidents and Incidents) Order; and

(b) Incidents of the following nature:

(1) Near collisions;

(2) Incidents occurring during critical phases of flight such as takeoff or landing that may have high potential of causing accidents, including for example undershoots, overruns, incursions, excursions, and take-offs and landings or attempted take-offs and landings on a closed or engaged runway;

(3) Controlled Flight Into Terrain (CFIT) only marginally avoided;

(4) Difficulties in controlling the aircraft, for example due to weather phenomena or operations outside the approved flight envelope;

(5) Flight crew incapacitation (including Human Factors issues, for example loss of situational awareness or spatial disorientation);

(6) Evacuation of crew and/or passengers;

(7) Use of fire extinguishing or suppression agents;

(8) Fire and smoke events, including those where the fires were extinguished;

(9) Events requiring the emergency use of oxygen;

(10) Gross failures to achieve predicted performance during takeoff or initial climb;

(11) Declaration of emergency (PAN or MAYDAY);

(12) Failure of or significant damage to aircraft primary structure (i.e. airframe failure) or disintegration of any internal or external part of the engine not classified as an accident;

(13) Failure of more than one system in a multiple-redundancy system required for flight guidance and navigation, not being circumstances permitted under the Minimum Equipment List;

(14) Violation of national safety legislation or requirements, including for example the ANO, AOCR and SAR;

(15) Air turn-backs;

(16) Diversions;

(17) Rejected take-offs;

(18) Significant safety and security related events, including for example bomb threats, hijack or similar events; security breaches; stowaways; and severe turbulence.

(19) Circumstances requiring a manoeuvre to avoid collision with another aircraft, including for example activation of Traffic Collision Avoidance System (TCAS) Resolution Advisory (RA);

(20) Activation of Enhanced Ground Proximity Warning System (EGPWS);

(21) Shutdown of an engine in flight for any reason;

(22) Confirmed hard landings;

(23) Windshear requiring pilot to initiate recovery action;

(24) Activation of stall warning or stick shaker;

(25) ATC-related events, including for example poor communication, lost communication, and misinterpretation of information or instructions by flight crew;

(26) Unintentional deviation of airspeed, intended track or altitude that result in the activation of a deviation notification;

(27) Lightning strikes;

(28) Bird strikes;

(29) Cabin crew incapacitation that renders him or her unable to perform critical safety duties;

(30) Abnormal aircraft or engine vibration;

(31) Blown tire or wheel failure;

(32) Damage to aircraft by foreign objects;

(33) Use of incorrect or contaminated fuel, oil or other fluid;

(34) Under fuelling;

(35) Loading or load sheet errors;

(36) Significant spillage or leakage of oil, fuel or other fluid;

(37) Spillage, leakage or any event related to the transport of dangerous goods;

(38) Carriage of dangerous goods in a manner that does not conform with the provisions of Annex 18 to the Convention on International Civil Aviation and its Technical Instructions; and

(39) Any other occurrence that endangers or may endanger the operation of an aircraft, or which causes or may cause a danger to persons or property.

Note : The list of reportable maintenance related-occurrences are contained in Chapter 4.9 of the Singapore Airworthiness Requirements.

3 Notification Requirements

3.1 The operator shall, upon becoming aware of an **accident**, or possible accident, involving an aircraft operated by the operator, notify the Authority **immediately** through the most expeditious means available. The operator shall also submit a formal written notification to the Authority within 3 hours after the initial notification.

3.2 The operator shall, upon becoming aware of any incident listed in paragraph **2.1(b)(1) to 2.1(b)(18)** above, notify the Authority **immediately** through the most expeditious means available. The operator shall also submit a formal written notification to the Authority within 24 hours following the completion of the affected flight; except that for incidents listed in **2.1(b)(15) to 2.1(b)(18)**, the written notification may be submitted within 3 working days following the completion of the affected flight, unless as advised otherwise by the Authority.

3.3 The operator shall, upon becoming aware of any incident listed in paragraph **2.1(b)(19) to 2.1(b)(40)** above, submit a formal written notification to the Authority within 3 working days following the completion of the affected flight.

Notwithstanding this, if the occurrence is judged to have a high safety consequence, the operator should endeavour to notify the Authority as soon as practicable.

3.4 All formal written notifications shall be made using form CAAS(AW)139 or in any other manner acceptable to the Authority.

3.5 The operator should aim to provide all available and accurate information in the initial report, however the operator should not delay the initial notification because of incomplete information. Follow-up reports should be provided as more information becomes available, following the guidelines set out in the form CAAS(AW)139. Prompt advice to the Authority on the results of investigations and the actions taken to control the situation will minimise or may render unnecessary direct CAAS involvement in the investigative activity.

APPENDIX R

REDUCED VERTICAL SEPARATION MINIMUM (RVSM)

EFFECTIVE DATE : 23 JULY 2010
REVISION NO : 18 (ISSUE 3)

This appendix contains specific RVSM requirements referred to in paragraph 21.3 of Chapter 2.

1 DEFINITIONS

1.1 Altimetry system error (ASE) means the difference between the altitude indicated by the altimeter display, assuming a correct altimeter barometric setting, and the pressure altitude corresponding to the undisturbed ambient pressure.

1.2 Total vertical error (TVE) means the vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level).

2 REQUIREMENTS

2.1 To qualify for RVSM operational approval, an aeroplane shall be equipped in accordance with the Sixth Schedule of the ANO.

2.2 The operator shall also comply with the airworthiness aspects of operation approval requirements set out in AOCR Chapter 8 paragraph 8.18.3.

2.3 The operator seeking RVSM operational approval shall also demonstrate to the satisfaction of the Authority that the vertical navigation performance capability of the aeroplane meets the MASPS requirements in paragraph 3 of this appendix.

3 MINIMUM AIRCRAFT SYSTEMS PERFORMANCE SPECIFICATION (MASPS)

3.1 The altimetry system performance for operation in RVSM airspace in respect of groups of aeroplanes that are nominally of identical design and build with respect to all details that could influence the accuracy of height-keeping performance capability shall be such that the total vertical error (TVE) for the group of aeroplanes shall have a mean no greater than 25 m (80ft) in magnitude and shall have a standard deviation no greater than $28 - 0.013z^2$ for $0 \leq z \leq 25$ when z is the magnitude of the mean TVE in metres, or $92 - 0.004z^2$ for $0 \leq z \leq 80$ where z is in feet.

3.2 In addition, the components of TVE shall have the following characteristics:

i. The mean altimetry system error (ASE) of the group shall not exceed 25m (80ft) in magnitude;

ii. The sum of the absolute value of the mean ASE and of three standard deviations of ASE shall not exceed 75 m (245 ft); and

iii. The differences between cleared flight level and the indicated pressure altitude actually flown shall be symmetric about a mean of 0 m (0 ft), with a standard deviation no greater than 13.3 m (43.7 ft), and in addition, the decrease in the frequency of differences with increasing difference magnitude shall be at least exponential.

3.3 In respect of aeroplanes for which the characteristics of the airframe and altimetry system fit are unique and so cannot be classified as belonging to a group of aeroplanes encompassed by paragraphs 3.1 and 3.2, the height-keeping performance capability shall be such that the components of the TVE of the aeroplane have the following characteristics:

(a) The ASE of the aeroplane shall not exceed 60 m (200 ft) in magnitude under all flight conditions; and

(b) The difference between the cleared flight level and the indicated pressure altitude actually flown shall be symmetric about a mean of 0 m (0 ft), with a standard deviation no greater than 13.3 m (43.7 ft), and in addition, the decrease in the frequency of differences with increasing difference magnitude shall be at least exponential.

4 CONTINUING COMPLIANCE OF MASPS

4.1 With effect from 18 November 2010, the operator with RVSM operational approval shall set in place a programme to ensure that a minimum of two aeroplanes of each aeroplane-type grouping have their height-keeping performance monitored at least once every two years or within intervals of 1000 flight hours per aeroplane, whichever period is the longer.

4.2 If the operator's aeroplane-type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period.

APPENDIX S

DEFINITIONS FOR ADDITIONAL REQUIREMENTS FOR HELICOPTER OPERATIONS

EFFECTIVE DATE : 9 FEBRUARY 2015
REVISION NO : 27 (ISSUE 3)

DEFINITIONS

"Alternate heliport" means a heliport to which a helicopter may proceed when it becomes either impossible or inadvisable to proceed to or to land at the heliport of intended landing. Alternate heliports include the following:

> "Take-off alternate" means an alternate heliport at which a helicopter can land should this become necessary shortly after take-off and it is not possible to use the heliport of departure.
>
> "En-route alternate" means a heliport at which a helicopter would be able to land after experiencing an abnormal or emergency condition while en route.
>
> "Destination alternate" means an alternate heliport to which a helicopter may proceed should it become either impossible or inadvisable to land at the heliport of intended landing.

Note : The heliport from which a flight departs may be an en-route or a destination alternate heliport for that flight.

"Approach and landing phase" means that part of the flight from 300m (1000ft) above the elevation of the final approach and take-off area, if the flight is planned to exceed this height, or from the commencement of the descent in the other cases, to a landing or to the balked landing point.

"Category A" with respect to helicopters, means a multi-engined helicopter designed with engines and system isolation features capable of operations using take-off and landing data scheduled under a critical engine failure concept which assures adequate designated surface area and adequate performance capability for continued safe flight or safe rejected take-off.

"Category B" with respect to helicopters, means a single engine or multi-engined helicopter which does not meet Category A standards. Category B helicopters have no guaranteed capability to continue safe flight in the event of an engine failure, and a forced landing is assumed.

"Circling" means the visual phase of an instrument approach to bring the aircraft into position for landing which is not suitably located for a straight in approach.

"Cloud base" means the height of the lowest observed, or forecast, cloud element in the vicinity of an aerodrome, or heliport, or within a specified area of operations. The height and cloud base is normally measured above aerodrome elevation, but in the case of offshore operations cloud base is measured above mean sea level.

"Congested hostile environment" means a hostile environment within a congested area.

"Crew member" means a person assigned by an operator of an aircraft to be involved in the operation of the aircraft during any portion of a flight.

"Decision altitude (DA) or decision height (DH)", in relation to the operation of an aircraft at an aerodrome, means a specified altitude or height in a 3D instrument approach operation at which the pilot-in-command must initiate a missed approach if the required visual reference to continue the approach has not been established.

"Defined point after take-off" (DPATO) means the point, within the take-off and initial climb phase, before which the helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required.

Note: Defined points apply to helicopters operating in performance class 2 only.

"Defined point before landing" (DPBL) means the point, within the approach and landing phase, after which the helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required.

"Elevated heliport" means a heliport located on a raised structure on land which is at least 3m from the surrounding surface.

"En-route phase" means that part of the flight from the end of the take-off and initial climb phase to the commencement of the approach and landing phase.

"Final approach and take-off area" (FATO) means a defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced. Where the FATO is to be used by helicopters operating in performance Class 1, the defined area includes the rejected take-off area available.

"Flight Safety Documents System" means a set of interrelated documentation established by the operator, compiling and organizing information necessary for flight and ground operations, comprising as a minimum, the operations manual and the operator's control manual

"Flight Simulation Device" means any one of the following three types of apparatus in which flight conditions are simulated on the ground:

A flight simulator, which provides an accurate representation of the flight deck of a particular aircraft type to the extent that the mechanical, electrical and electronic, etc aircraft systems control functions, the normal environment of flight crew members, and the performance and flight characteristics of that type of aircraft are realistically simulated.

A flight procedures trainer, which provides a realistic flight deck environment, and which simulates instrument responses, simple control functions of mechanical, electrical, electronics, etc aircraft systems, and the performance and flight characteristics of aircraft of a particular class.

A basic instrument flight trainer, which is equipped with appropriate instruments, and which simulates the flight deck environment of an aircraft in flight in instrument flight conditions.

"Flight time" with respect to helicopters, mean the total time from the moment a helicopter's rotor blades start turning until the moment the helicopter finally comes to rest at the end of the flight, and the rotor blades are stopped.

"Helicopter" means a heavier than air aircraft supported in flight chiefly by the reactions of the air on one or more power-driven rotors on substantially vertical axes.

"Helideck" means a heliport located on a floating or fixed offshore structure.

"Heliport" means an aerodrome of a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

> **Note.** Helicopters may be operated to and from areas other than a heliport.

"Heliport operating minima". The limits of usability of a heliport for:

(a) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;

(b) landing in 2D instrument approach operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions; and

(c) landing in 3D instrument operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the type and/or category of the operation.

"Hostile Environment" means an environment in which:

(a) a safe forced landing cannot be accomplished because the surface and surrounding environment are inadequate;

(b) the helicopter occupants cannot be adequately protected from the elements;

(c) search and rescue response/capability is not provided consistent with the anticipated exposure; or

(d) there is an unacceptable risk of endangering persons or property on the ground.

"Human Factors Principles" means principles which apply to aeronautical designs, certification training, operations and maintenance and which seek safe interface between human and other system components by proper consideration to human performance.

"Human Performance" means human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

"Integrated survival suit" means a survival suit which meets the combined requirements of the survival suit and life jacket.

"Landing Decision Point" (LDP) means The point used in determining landing performance from which, a power unit failure occurring at this point, the landing may be safely continued or a balked landing initiated.

Note: LDP applies only to helicopters operating in performance Class 1

"Landing distance available" (LDAH) means the length of the final approach and take-off area plus any additional area declared available and suitable for helicopters to complete the landing manoeuvre from a defined height.

"Landing distance required" (LDRH) means the horizontal distance required to land and come to a full stop from a point 15m (50ft) above the landing surface.

"Low Visibility Take-off" (LVTO) means a take-off where the Runway Visual Range (RVR) is less than 400m.

"Minimum descent altitude (MDA)/minimum descent height (MDH)" means a specified altitude or height in a 2D instrument approach or circling approach below which descent must not be made without the required visual reference.

"Non-congested hostile environment" means a hostile environment outside a congested area.

"Non-hostile environment" means an environment in which:

(a) a safe landing can be accomplished because the surface and surrounding environment are adequate;

(b) the helicopter occupants can be adequately protected from the elements;

(c) search and rescue response/capability is provided consistent with anticipated exposure; and

(d) the assessed risk of endangering persons or property on the ground is acceptable.

Note: Those parts of a congested area satisfying the above requirements are considered non-hostile.

"Obstacle clearance altitude (OCA) / obstacle clearance height (OCH)" means the lowest altitude or lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

"Offshore operations" means operations which routinely have a substantial proportion of the flight conducted over sea areas to or from offshore locations. Such operations include, but are not limited to, support of offshore oil, gas and mineral exploitation and sea-pilot transfer.

"Operation" means an activity or group of activities which are subject to the same or similar hazards and which require a set of equipment to be specified, or the achievement and maintenance of a set of pilot competencies, to eliminate or mitigate the risk of such hazards.

"Operations in performance Class 1" means operations with performance such that, in the event of a critical power unit failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, unless the failure occurs prior to reaching the take-off decision point (TDP) or after passing the landing decision point (LDP), in which case the helicopter must be able to land within the rejected take-off or landing area.

"Operations in performance Class 2" means operations with performance such that, in the event of a critical power unit failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, except when the failure occurs early during the take-off manoeuvre or late in the landing manoeuvre, in which cases a forced landing may be required.

"Operations in performance Class 3" means Operations with performance such that, in the event of a power unit failure at any time during the flight, a forced landing may be required.

"Rejected take-off distance required" (RTODR) means the horizontal distance required from the start of the take-off to the point where the helicopter comes to a full stop following a power-unit failure and rejection of the take-off to the take-off decision point.

"Runway visual range" (RVR) means the range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

"Safe forced landing" means an unavoidable landing or ditching with a reasonable expectancy of no injuries to persons in the aircraft or on the surface.

"Safety area" means a defined area on a heliport surrounding the FATO which is free of obstacles, other than those required for air navigation purposes, and intended to reduce the risk of damage to helicopters accidentally diverging from the FATO.

"Series of flights" means consecutive flights that;

(a) begin and end within a period of 24 hours; and

(b) are conducted by the same pilot-in-command

"Take-off and initial climb phase" means that part of the flight from the start of take-off to 300 m (1,000 ft) above the elevation of the FATO, if the flight is planned to exceed this height, or to the end of the climb in the other cases.

"Take-off decision point (TDP)" means the point used in determining the take-off performance from which, a power unit failure occurring at this point, either a rejected take-off may be made or a take-off safely continued.

"Take-off distance available" (TODAH) means the length of the final approach and take-off area plus the length of helicopter clearway (if provided) declared available and suitable for helicopters to complete the take-off.

"Take-off distance required" (TODRH) means the horizontal distance required from the start of the take-off to the point at which VTOSS, a selected height and a positive climb gradient are achieved, following failure of the critical power-unit being recognised at TDP, the remaining power-units operating within approved operating limits.

"Take-off flight path" means the vertical and horizontal path, with the critical power-unit inoperative, from a specified point in the take-off to 300 m (1000 ft) above the surface.

"Touchdown and lift-off area" (TLOF) means a load bearing area on which a helicopter may touchdown or lift off.

"Visual Approach" means an approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed with visual reference to the terrain.

"Vtoss" means the minimum speed at which climb shall be achieved with the critical power unit inoperative, the remaining power units operation within approved operating limits.

ABBREVIATIONS

D	Maximum dimension of helicopter
DPBL	Defined point before landing
DPATO	Defined point after take-off
DR	Distance travelled (helicopter)
FATO	Final approach and take-off area
ft	Feet
HFM	Helicopter flight manual
IFR	Instrument flight rules
ILS	Instrument landing system
LDP	Landing decision point
LDAH	Landing distance available (helicopter)
LDRH	Landing distance required (helicopter)
LLZ	Localiser
NM	Nautical mile
M	Metre
MDH	Minimum descent height
MEL	Minimum equipment list
MLS	Microwave landing system
NDB	Non-directional beacon
PAR	Precision approach radar
PNR	Point of no return
R	Rotor radius of helicopter
RTODR	Rejected take-off distance required (helicopter)
SRA	Surveillance radar approach
TDP	Take-off decision point
TLOF	Touch-down and lift-off area
TODAH	Take-off distance available (helicopter)
TODRH	Take off distance required (helicopter)
V TOSS	Take-off safety speed
VDF	Very-high frequency direction-finding
VFR	Visual flight rules
VOR	Very high frequency omni-directional radio range

APPENDIX T
OPERATING MINIMA

EFFECTIVE DATE : 9 FEBRUARY 2015
REVISION NO : 27 (ISSUE 3)

1 HELIPORT OPERATING MINIMA

1.1 Required RVR/Visibility for operations in performance Class 1

1.1.1 An operator operating in performance Class 1 shall establish an RVR and visibility respectively (RVR/VIS) as take-off minima in accordance with Table 1 below.

Table 1 – RVR/Visibility for take off

Onshore heliports with IFR departure procedure	RVR/Visibility
No lighting and no marking (Day)	250m or the rejected distance, whichever is greater
No marking (Night)	800m
Runway edge/FATO lighting and centre line marking	200m
Runway edge/FATO lighting, centre line marking and RVR information	150m
Offshore Helideck	
Two pilot operations	250m (1)

Note: The pilot-in-command must establish that the take-off path is free of obstacles.

1.2 2D instrument approach

1.2.1 An operator shall ensure that system minima for 2D instrument approach operation, which are based upon the use of ILS without glidepath (LLZ only), VOR, NDB, SRA, and VDF are not lower than the MDH values given in Table 2 below.

Table 2 – System minima for 2D instrument approach aide

Facility	Lowest MDH
ILS (no glide path – LLZ)	250 ft
SRA (terminating at ½ nm)	250 ft
SRA (terminating at 1 nm)	300 ft
SRA (terminating at 2 nm)	350 ft
VOR	300 ft
VOR/DME	250 ft
NDB	300 ft
VDH (QDM & OCH)	300 ft

1.2.2 For 2D instrument approach operation by helicopters performing operations in performance Class 1, the minima for RVR given in the following Table shall apply:

Table 3 – Onshore 2D instrument approach minima

Onshore 2D Instrument Approach Minima (5)(6)				
MDH (ft)	**Facilities/RVR**			
	Full (1)	**Intermediate (2)**	**Basic (3)**	**Nil (4)**
250-299 ft	600 m	800 m	1 000 m	1 000 m
300-449 ft	800 m	1 000 m	1 000 m	1 000 m
450 ft and above	1 000 m	1 000 m	1 000 m	1 000 m

Note 1: Full facilities comprise FATO/runway markings, 720 m or more of Hi/Mi approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights must be on.

Note 2: Intermediate facilities comprise FATO/runway markings, 420 – 719 m of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights must be on.

Note 3: Basic facilities comprise FATO/runway markings, <420 m Hi/Mi approach lights, any length of LI approach lights. FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights must be on.

Note 4: Nil approach lights facilities comprise FATO/runway markings. FATO/runway edge lights, threshold lights, FATO/runway end lights or no lights at all.

Note 5: The tables are only applicable to conventional approaches with a nominal descent slope of not greater than 4 degrees. Greater descent slopes will usually require that visual guide slope guidance (e.g. PAPI) is also visible at Minimum Descent Height.

Note 6: The MDH mentioned in Table 3 refers to the initial calculation of MDH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest ten feet, which may be done for operational purposes e.g. conversion to MDA

1.3 3D Instrument Approach – Category I operations

1.3.1 For helicopters performing Category I operations in Performance Class 1 the following minima for RVR shall apply:

Table 4 – Onshore 3D Instrument Approach Minima – Category I

Onshore 3D Instrument Approach Minima – Category I (5)(6)(7)				
	Facilities/RVR			
	Full (1)	Intermediate (2)	Basic (3)	Nil (4)
200 ft	500 m	600 m	700 m	1 000 m
201-250 ft	550 m	650 m	750 m	1 000 m
251-300 ft	600 m	700 m	800 m	1 000 m
301 ft & above	750 m	800 m	900 m	1 000 m

Note 1: Full facilities comprise FATO/runway markings, 720 m or more of Hi/Mi approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights must be on.

Note 2: Intermediate facilities comprise FATO/runway markings, 420 – 719 m of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights must be on.

Note 3: Basic facilities comprise FATO/runway markings, <420 m Hi/Mi approach lights, any length of LI approach lights. FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights must be on.

Note 4: Nil approach lights facilities comprise FATO/runway markings. FATO/runway edge lights, threshold lights, FATO/runway end lights or no lights at all.

Note 5: The Table is applicable to conventional approaches with a glide slope angle up to and including 4 degrees.

Note 6: The DH mentioned in Table 4 refers to the initial calculation of DH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest ten feet, which may be done for operational purposes e.g. conversion to DA.

Note 7: The DH mentioned in Table 4 refers to the initial calculation of DH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest ten feet, which may be done for operational purpose (e.g. conversion to DH)

2 MINIMUM VISIBILITIES FOR VFR OPERATIONS

Table 5 – Minimum Visibilities for VFR Operations

Airspace Class	A, B, C, D	G
		At or below 900m (3000ft) above terrain, whichever is the higher
Distance from cloud	1500m horizontally 300m (1000 ft) vertically	Clear of cloud in sight of surface
Flight Visibility	8 km at or above 3050 m (10000 ft) 5 km below 3050 (10000ft) AMSL (Note 2)	5 km (Note 2)

Note 1: When the height of the transition altitude is lower than 3050m (10000 ft) AMSL, FL100 should be used in lieu of 10000ft

Note 2: Helicopters may be operated in Special VFR in flight visibility down to 1500m by day, provided ATC permits use of flight visibility less than 5 km, and the circumstances are such, that the probability of encounters with other traffic is low, and the IAS is 140 knots or less.

3 MINIMA FOR FLYING BETWEEN HELIDECKS LOCATED IN CLASS G AIRSPACE

Table 6 – Minima for flying between helidecks located in class G airspace

	Day		Night	
	Height (Note 1)	**Visibility**	**Height (Note 1)**	**Visibility**
Single Pilot	300 ft	3 km	500 ft	5 km
Two Pilots	300 ft	2 km (Note 2)	500 ft	

Note 1: The cloud base shall be such as to allow flight at the specified height below and clear of cloud.

Note 2: Helicopters may be operated in flight visibility down to 1500m provided the destination or an intermediate structure are continuously visible.

APPENDIX U
LOW VISIBILITY OPERATIONS – TRAINING AND QUALIFICATIONS

EFFECTIVE DATE : 3 AUGUST 2010
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1 GENERAL

1.1 An operator shall develop flight crew member training programmes and ensure that the programmes for low visibility operations include structured courses of ground, flight simulator and/or flight training.

1.2 Flight crew members with no experience in Category II or III operations must satisfy the training requirements contain in this Appendix.

1.3 The operator may abbreviate the course content for pilots with Category II and III experience, provided the content of the abbreviated course is acceptable to the Authority.

(a) Flight crew members with Category II and III experience may undertake an abbreviated ground training course.

(b) Flight crew members with Category II or III experience with the operator may undertake an abbreviated ground, flight simulator and/or flight training course. The abbreviated course must include at least the requirements in Paragraph 4.

2 GROUND TRAINING

2.1 An operator must ensure that the initial ground training course for low visibility operations covers at least:

(a) The characteristics and limitations of the ILS and/or MLS;

(b) The characteristics of the visual aids;

(c) The characteristics of fog;

(d) The operational capabilities and limitations of the particular airborne system;

(e) The effects of precipitation, ice accretion, low level wind shear and turbulence;

(f) The effects of specific helicopter malfunctions;

(g) The use and limitations of RVR assessment systems;

(h) The principles of obstacle clearance requirements;

(i) Recognition and action to be taken in the event of failure of ground equipment;

(j) The procedures and precautions to be followed with regard to surface movement during operations when the RVR is 400 m or less and any additional procedures required for take-off in condition below 150 m;

(k) The significance of Decision Heights based upon radio altimeters and the effect of terrain profile in the approach area on radio altimeter readings and on the automatic approach/landing systems;

(l) The importance and significance of Alert Height if applicable and the action in the event of any failure above and below the alert height;

(m) The qualification requirements for pilots to obtain and retain approval to conduct Low Visibility Take-offs and Category II and III operations; and

(n) The importance of correct seating and eye position.

3 FLIGHT SIMULATOR TRAINING AND/OR FLIGHT TRAINING

3.1 An operator shall ensure that flight simulator and/or flight training for low visibility operations includes:

(a) Checks of satisfactory functioning of equipment, both on the ground and in flight;

(b) Effect of minima caused by changes in the status of ground installations;

(c) Monitoring of automatic flight control systems and auto-land status annunciators with emphasis on the action to be taken in the event of failures of such systems;

(d) Action to be taken in the event of failures such as engines, electrical systems, hydraulics or flight control system;

(e) The effect of known unserviceabilities and use of minimum equipment lists;

(f) Operating limitations resulting from airworthiness certification;

(g) Guidance on the visual cues required at decision height together with information on maximum deviation allowed from glidepath or localiser; and

(h) The importance and significance of Alert Height if applicable and the action in the event of any failure above and below the Alert Height.

3.2 Each flight crew member shall be trained to carry out his duties and instructed on the coordination required with other crew members. Maximum use should be made of suitably equipped flight simulators for this purpose.

3.3 Training shall be divided into phases covering normal operations with no helicopter or equipment failures but including all weather conditions which may be encountered and detailed scenarios of helicopter and equipment failure which could affect Category II or III operations. If the helicopter system involves the use of hybrid or other special systems (such as head up displays or enhanced vision equipment), flight crew members must practice the use of these systems during the flight simulator phase of training.

3.4 The operator shall include training on incapacitation procedures appropriate to low visibility take-offs and Category II or III operations.

3.5 For helicopters with no type specific flight simulator, operators must ensure that the flight training phase specific to the visual scenarios of Category II operations is conducted in a flight simulator approved for the purpose by the Authority. Such training must include a minimum of 4 approaches. Training that is type specific shall be practiced in the helicopter.

3.6 Category II and III training shall include at least the following exercise:

(a) Approach using the appropriate flight guidance, autopilots and control systems installed in the helicopter, to the appropriate decision height and to include transition to visual flight and landing;

(b) Approach with all engines operating using the appropriate flight guidance systems, autopilots and control systems installed in the helicopter down to the appropriate decision height followed by missed approach, all without external visual reference;

(c) Where appropriate, approaches using automatic flight systems to provide automatic flare, hover, landing and roll-out; and

(d) Normal operations of the applicable system both with and without acquisition of visual cues at decision height.

3.7 Subsequent phases of training shall include at least:

(a) Approaches with engine failure at various stages of the approach

(b) Approaches with critical equipment failure (e.g. electrical systems, autoflight systems, ground and /or airborne ILS/MLS systems and status monitor).

(c) Approaches where failure of autoflight equipment at low level require either:

(i) Reversion to manual flight to control flare, hover, landing and roll out or missed approach; or

(ii) Reversion to manual flight on a degraded automatic mode to control missed approaches from, at or below decision height including those which may result in a touchdown on the runway.

(d) Failure of the systems which will result in excessive localiser and/or glide-slope deviation, both above and below decision height, in the minimum visual conditions authorised for the operation. In addition a continuation to a manual landing must be practiced if a head-up display forms the only flare mode; and

(e) Failures and procedures specific to helicopter type or variant.

3.8 The training programme must provide practice in handling faults which require a reversion to higher minima.

3.9 The training programme must include, the handling of the helicopter when, during a fail passive Category III approach, the fault causes the autopilot to disconnect at or below decision height when the last reported RVR is 300 m or less.

3.10 When take-offs are conducted in RVRs of 400 m or below, training shall be established to cover systems failure and engine failures resulting in continued as well as rejected take-offs.

4 Conversion Training Requirements to conduct Low Visibility Take-off and Category II and III operations.

4.1 Each flight crew member shall successfully complete low visibility procedure training to qualify for conversion to a new type or variant of helicopter in which the low visibility take-off and Category II and III Operations will be conducted. A flight crew member may undertake an abbreviated training programme in accordance with Paragraph 1.3 provided he has the necessary training and experience.

4.2 Ground training shall followed the requirements contained in Paragraph 2.1, taking into account the flight crew member’s training and experience in Category II and III operations.

4.3 Notwithstanding Paragraph 1.3, a flight crew member undergoing simulator training and/or flight training shall meet the following requirements:

(a) A minimum of 8 approaches and/or landings in a flight simulator approved for the purpose;

(b) When no type specific flight simulator is available, a minimum of 3 approaches including at least one go-around is required on the helicopter; and

(c) Appropriate additional training if any special equipment is required such as head-up displays or enhanced vision equipment.

4.4 **Flight Crew Qualification**

4.4.1 The operator shall ensure that each flight crew member completes a check specific to the operator and the type of helicopter operated before conducting Category II or III operations. The check may be replaced by the successful completion of the flight simulator and/or flight training prescribed in Paragraph 4.3 above.

4.5 **Line Flying under Supervision.**

4.5.1 An operator shall ensure that each flight crew member shall have undergone supervision before performing the following operations:

(a) For Category II when a manual landing is required, a minimum of 3 landings from autopilot disconnect.

(b) For Category III, a minimum of 3 autolands except that only 1 autoland is required when the training required in sub-paragraph 4.3 above has been carried out in a full flight simulator usable for zero flight time training.

4.6 **Addition Experience Requirements for Pilot-in-command**

4.6.1 The operator shall not designate a flight crew member as pilot-in-command for low visibility take-off, and Category II and III operations unless the flight crew member has achieved:

(a) 50 hours or 20 sectors as pilot-in-command on the type before performing any Category II or III operations; and

(b) 100 hours or 40 sectors as pilot-in-command on the type. 100 m must be added to the applicable Category II or III RVR minima unless he has been previously qualified for Category II or III operations with another operator.

4.6.2 The Authority may authorise a reduction in the command experience requirement contained in Paragraph 0 for flight crew members who have Category II or III command experience.

4.7 **Low visibility Take-off with RVR less than 150m**

4.7.1 An operator must ensure that prior to authorisation to conduct take-offs in RVRs below 150 m the following training is carried out:

(a) Normal take-off in minimum authorised RVR conditions;

(b) Take-off in minimum authorised RVR conditions with an engine failure at or after TDP; and

(c) Take-off in minimum authorised RVR conditions with an engine failure before the TDP.

4.7.2 An operator shall ensure that the training required in sub-paragraph 4.7.1 above is carried out in an approved flight simulator. This training must include the use of any special procedures and equipment. Where no approved simulator exists, the Authority may approve such training in a helicopter without the requirement for minimum RVR conditions.

4.7.3 An operator shall ensure that a flight crew member has completed a check before conducting low visibility take-offs in RVRs of less than 150 m if applicable. The check may only be replaced by successful completion of the flight simulator and/or flight training prescribed in sub-paragraph 4.7.1 on initial conversion to a helicopter type.

4.8 Recurrent Training and Checking

4.8.1 An operator shall ensure that, in conjunction with the normal recurrent training and operator proficiency checks, a pilot's knowledge and ability to perform the tasks associated with the particular category of operation, including low visibility take-off for which he is authorised is checked.

4.8.2 The recurrent training shall include a minimum of two approaches, of which one must be a missed approach and at least one low visibility take-off to the lowest applicable minima. The period of validity for this check is 6 months including the remainder of the month of issue.

4.8.3 Recurrent training and checking for Category III operations must be performed in a flight simulator approved by the Authority for Category III training.

4.8.4 For recurrent training and checking for Category III operations on helicopters with a fail passive flight control system, the operator shall ensure that flight crew members completes training at least once every 18 months for a missed approach as a result of an autopilot failure at or below decision height when the last reported RVR is 300 m or less.

4.8.5 The Authority may authorise recurrent training for Category II operations in a helicopter type where no approved flight simulator is available.

4.9 Recency Requirements

4.9.1 The operator shall not assign a flight crew member to function as a pilot-in-command or a co-pilot for low visibility take-off, Category II and III operations unless he has maintained his recency for low visibility take-off, Category II and III operations by having carried out at least three approaches and landings using approved Category II/III procedures, at least one of which must be conducted in the helicopter, in the preceding 180 days.

APPENDIX V
MIXED FLEET FLYING (MFF)

EFFECTIVE DATE : 20 MAY 2011
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DEFINITIONS

(a) **Mixed Fleet Flying (MFF)**
The operation of Primary MFF Aeroplane and Secondary MFF Aeroplane by a Singapore AOC holder.

(b) **Primary MFF Aeroplane**
An aeroplane, or group of aeroplanes, designated by a Singapore AOC holder and used as a reference to compare differences with the Secondary MFF Aeroplane within the operator's fleet.

(c) **Secondary MFF Aeroplane**
An aeroplane, or group of aeroplanes, of a different type or variant from the Primary MFF Aeroplane.

(d) **Variant**
An aeroplane, or a group of aeroplanes, that has the same characteristics as the Primary MFF Aeroplane but is different from the Primary MFF Aeroplane such that additional flight crew knowledge, skills and/or abilities are required in order to operate it.

1 GENERAL

1.1 An operator who intends to commence Mixed Fleet Flying (MFF) operations shall apply for approval from the Authority. The Authority, when satisfied that the operator meets the requirements, may approve the MFF application with or without conditions imposed.

1.1 An application under paragraph 1.1 shall be accompanied by the following documents:

(a) Assessment by the manufacturer on the suitability of the aeroplane type(s) to be engaged in MFF;

(b) an MFF policy and supporting procedures; and

(c) an MFF Programme including the aeroplane type(s) to be used for the Primary and Secondary MFF Aeroplane.

1.3 An operator who is approved to conduct MFF operations shall only use a Secondary MFF Aeroplane that is approved by the Authority.

1.4 The operator shall conduct the MFF operation in accordance with the approval granted by the Authority.

1.5 The MFF Policy and Programme shall be documented in the Operations Manual and/or Training Manual.

2 PRE-REQUISITIES FOR MFF OPERATION – PILOT QUALIFICATION

2.1 The operator shall ensure that each pilot:

(a) has completed at least two consecutive base checks;

(b) has at least 500 total flying hours in the relevant crew position; and

(c) has at least 3 months and 150 flying hours' experience on the Primary MFF Aeroplane,

with the operator before he is inducted into the operator's MFF Programme.

3 MFF PROGRAMME

3.1 The operator's MFF Programme shall describe the process for qualifying a pilot to become an MFF pilot. It shall encompass the following:

(a) the necessary training to obtain an aeroplane type rating on Secondary MFF Aeroplane;

(b) a Consolidation Period; and

(c) MFF Indoctrination Training.

Note: While undergoing the MFF Programme, the pilot may continue to engage in commercial air transport and is subject to the requirement in Chapter 4, paragraph 1.8.1.

Consolidation Period

3.2 The operator shall ensure that the pilot accumulate sufficient operating experience on the Secondary MFF Aeroplane during the Consolidation Period.

3.3 The Consolidation Period shall, at the minimum, take into consideration the following factors:

(a) the extent of differences between Primary MFF aeroplane and Secondary MFF aeroplane;

(b) recommendations by the aircraft manufacturer(s); and

(c) experience of the operator.

MFF Indoctrination Training

3.4 The MFF Indoctrination Training shall be designed to equip the pilot with the necessary knowledge on MFF operations. This training shall be conducted either by qualified personnel or by any other means acceptable to the Authority.

3.5 The operator shall ensure that the pilot complete his MFF Programme within 12 months of his last base check on the Primary MFF Aeroplane.

4 OPERATOR'S OBLIGATIONS FOR PILOT'S LICENCE ENDORESEMENT

4.1 Before the pilot can seek endorsement on his licence for MFF operation, the operator must ensure that the pilot holds valid and current Certificates of Test on both Primary and Secondary MFF aeroplane types. The operator must also provide evidence to show that the pilot meets the pre-requisites for MFF operation and has successfully completed the MFF Programme.

5 PERIODICAL TESTS – MFF PILOTS

Base Checks

5.1 The operator shall ensure that each MFF pilot complete at least two base checks within the period of 12 months immediately preceding any commercial flight, with such checks being separated by an interval of not less than 4 months. The first base check to be conducted after the completion of the MFF Programme shall be on the aeroplane type of the next expiring base check. Subsequent base checks shall alternate between Primary MFF Aeroplane and Secondary MFF Aeroplane.

Line Checks

5.2 The operator shall ensure that each MFF pilot complete one line check within the period of 12 months immediately preceding any commercial flight. The first line check to be conducted after the completion of the MFF Programme shall be on the aeroplane type of the next expiring line check. Subsequent line checks shall alternate between Primary MFF Aeroplane and Secondary MFF Aeroplane.

5.3 In the event the base or line check on the Primary MFF aeroplane or Secondary MFF aeroplane lapses, or a pilot failed the check, the operator shall not allow the pilot to carry out his flying duties. The pilot may carry out his flying duties when the particular base or line check on the lapsed or failed aeroplane type is renewed or revalidated.

MFF Recent Type Experience

5.4 The operator shall not assign a pilot to fly as an MFF Pilot-in-Command (PIC) unless he has carried out at least one take-off and one landing in either the Primary MFF Aeroplane or Secondary MFF Aeroplane during the previous 35 day period. An MFF PIC or co-pilot shall, in the preceding 90 days, complete at least three take offs and three landings, with at least one take-off and one landing in each of the Primary MFF Aeroplane and Secondary MFF Aeroplane. The take-off(s) and landing(s) can also be carried out in an approved flight simulator of the same type/class.

6 CESSATION OF MFF OPERATION BY MFF PILOT

6.1 The operator shall inform the Authority of any MFF pilot who no longer carry out his flying duties as an MFF pilot.

7 ROSTERING MFF PILOTS

7.1 The operator shall not roster an MFF pilot to operate on both Primary MFF Aeroplane and Secondary MFF Aeroplane within the same day or Flight Duty Period.